THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXV. No. 1661.] LONDON, MARCH 12, 1895. [47TH YEAR. PRICE 6d.

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PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

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Special Quotations to Gas Companies.
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Lanemark Coal Co.,
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LANEMARK CANNEL AND GAS COALS.
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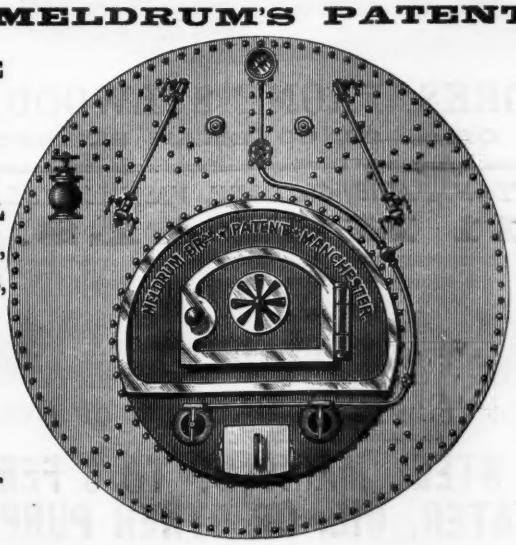

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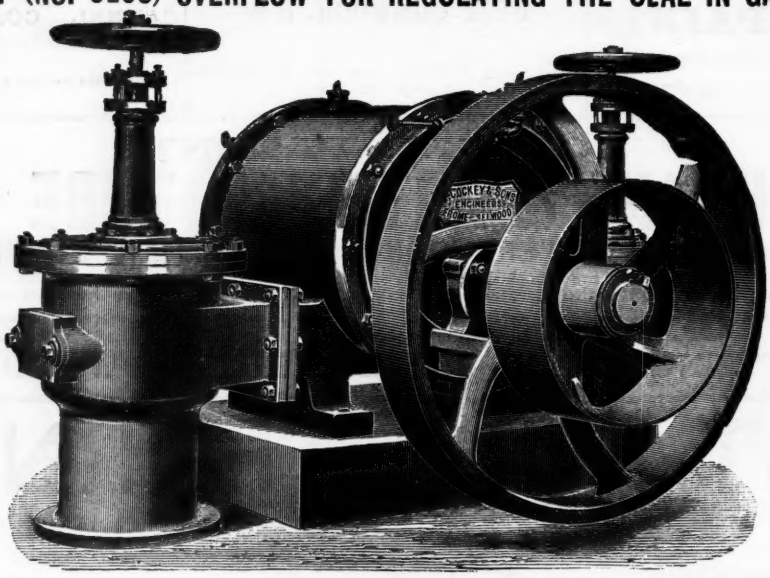

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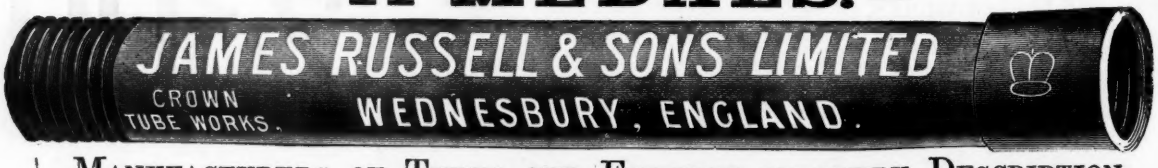

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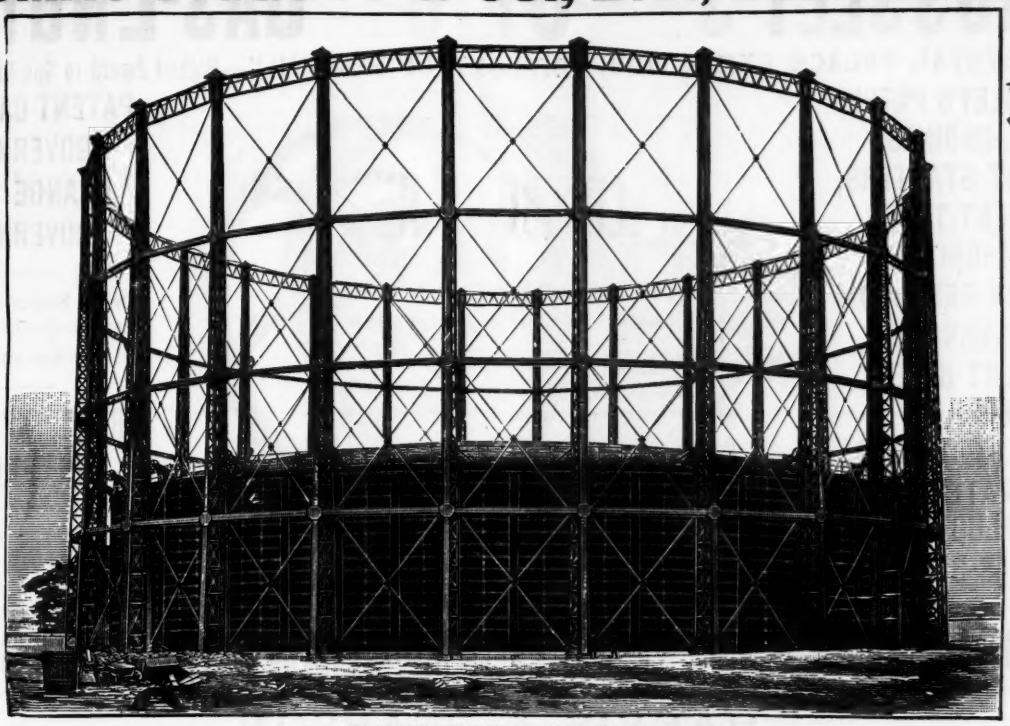

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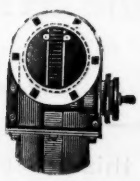

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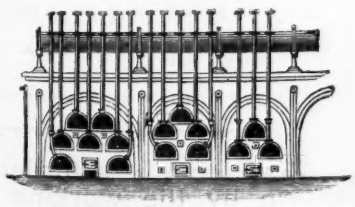

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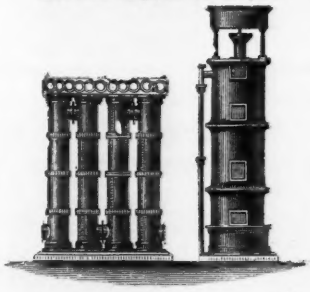

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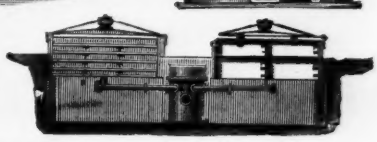

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GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

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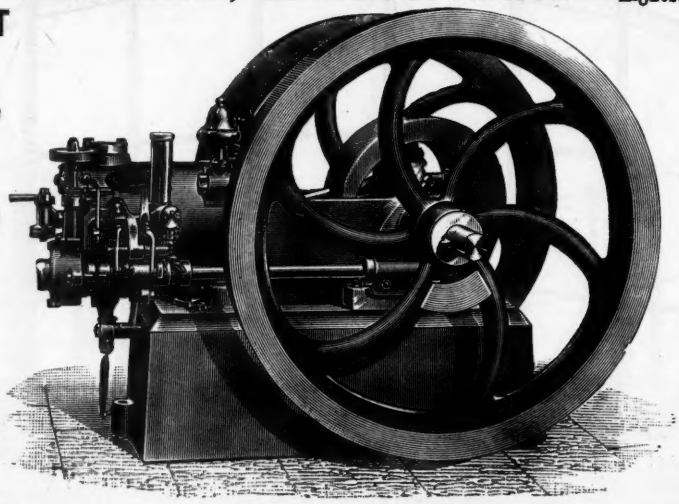

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ALL PARTS MADE STRICTLY TO GAUGE

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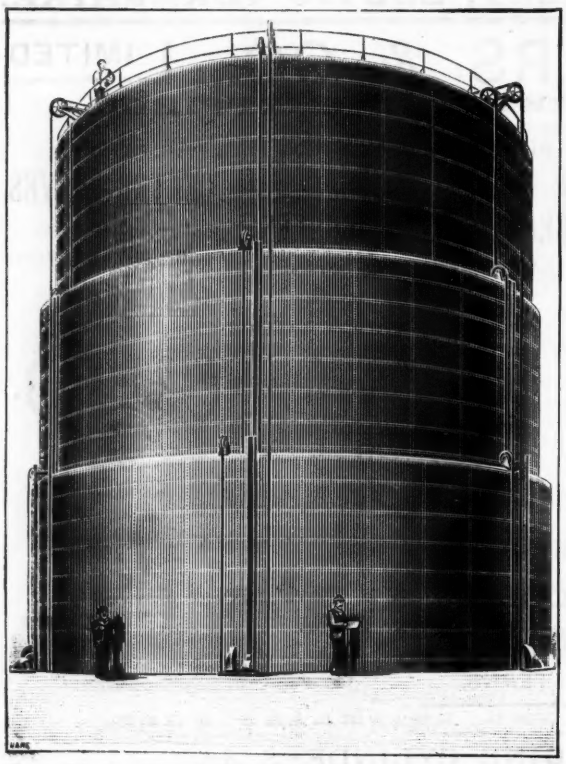

From Photo. of Three-Lift Roped Holder, 50 feet diameter by 18 feet deep each Lift. Erected at Sligo, 1894.

Pease's Patent Roped Gasholders

THESE HOLDERS HAVE WORKED SUCCESSFULLY UNDER EVERY TEST TO WHICH THEY HAVE BEEN SUBJECTED SINCE 1889.

MAY BE SEEN AT MANY PLACES.

Send for Catalogue if requiring increased Storage.

The security afforded by this System is shown by the working of the Three-Lift Holder, the subject of this engraving; not only was the Holder unaffected by the recent heavy gales, but also the recorded strain on the Ropes was remarkably small.

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Telegrams { "GASHOLDER, STOCKTON-ON-TEES." "APPARATUS, LONDON."

AMERICAN CANNEL.

Table of Analysis of the leading Scotch and English Cannels (from reports made by Mr. Geo. R. Hislop, F.C.S., F.R.S.S.A., Gas Engineer, of Paisley, Scotland), showing their value for Gas Enriching, as compared with the "Bear Creek" Cannel (50-inch vein), owned and mined by the Log Mountain Coal, Coke, and Timber Company, of Pineville, Bell County, Kentucky, U.S.A., as per report made by Mr. Hislop, dated Oct. 26, 1893.

NAME.	Gas per Ton of Coal in Cubic Feet.	Illuminating Power of Gas in Standard Candles.	Durability of one Cubic Foot of Gas by 5-inch Flame. Min.	Sec.	Value of Gas from one Ton of Coal in Pounds of Sperm.	Sulphur in Volatile Matters.	Coke per Ton of Coal in Pounds.	Quality of Coke, Ash per Cent.
LESMAHAGOW	13,201	34·52	66	40	1562·0	0·53	1019	10·60
Tyne Boghead	13,155	38·22	73	36	1723·0	0·38	1301	17·20
Arniston	12,560	35·46	69	0	1527·0	0·34	906	6·33
Newbattle	12,461	35·34	69	30	1509·0	0·51	983	7·00
Niddrie No. 1	12,330	32·45	62	30	1371·8	0·43	1074	4·80
Kinneil	12,070	30·89	66	0	1277·0	0·67	1230	8·02
Balbardie	12,083	34·31	65	47	1421·0	0·23	1056	4·13
BEAR CREEK	14,630	41·24	78	45	2069·0	0·41	995	7·70

THERE'S NOTHING LIKE IT!!

"BEAR CREEK" has absolutely NO EQUAL as a Gas Cannel. Our LOW PRICE is made possible by the thick Seam—50 inches, solid, pure Cannel—and by the low cost of Mining (surface drift).

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THE UNIQUE FEATURE.

High yield of very Rich Gas, and a splendid, Light Spongy Coke—equal to that derived from best Gas Coals.

READ THE FOLLOWING EXPERT OPINIONS.

Mr. JOHN METHVEN, Assoc.M.Inst.C.E., Gas Engineer, Beckton (London), after personal test of eighteen Experiments, says—
"The results are sufficient to stamp this Cannel as being one of the most valuable obtainable. Not only does it possess a high yield of very rich gas, but its production of coke is of large quantity and of a quality rarely found in Cannels producing such a rich volume of gas."

Mr. GEO. R. HISLOP, F.C.S., F.I.Inst., F.R.S.S.A., Gas Engineer, Paisley, Scotland, says—
"This is a Cannel Coal of exceptional value, as it is one of remarkable light-giving power and purity; yielding, as it does, a sperm value of illuminating matter amounting to **2068·69** lbs. per ton, while at same time affording a light and spongy coke of excellent quality. The Coal contains a very small percentage of both water and sulphur. Compared with Main Lesmahagow Cannel Coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1535·5 lbs. of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas), this Coal is equal to **137·11.**"

Detailed Analysis and Copy of Letters from fifteen American Gas Engineers sent on application.

Shipping Ports: NORFOLK AND NEWPORT NEWS, VIRGINIA, AND PENSACOLA, FLORIDA.

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MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

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More Gas and saleable Coke per ton of Coal Carbonized is produced; saving Capital, Labour, Fuel, Wear and Tear, &c.

The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

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BANBURY	2 BEDS	PETERBOROUGH	1 BED
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ASHTON-IN-MAKERFIELD	2 „	DESBOROUGH	1 BED
GOLBORNE	2 „	FINEDON	1 „
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NEWCASTLE (New South Wales) HAVE ORDERED TWO BEDS OF SIX.

Orders on hand for 24 more Beds.

Condensers, Scrubbers, Purifiers, Gasholders, &c.,

SUPPLIED AND FITTED UP COMPLETE.

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PREVENT YOUR GASHOLDER CUPS FROM FREEZING

BY USING

CLAYTON'S

IMPROVED ANTI-FREEZING APPARATUS

It is the CHEAPEST, SIMPLEST, and MOST EFFECTIVE in the Market.

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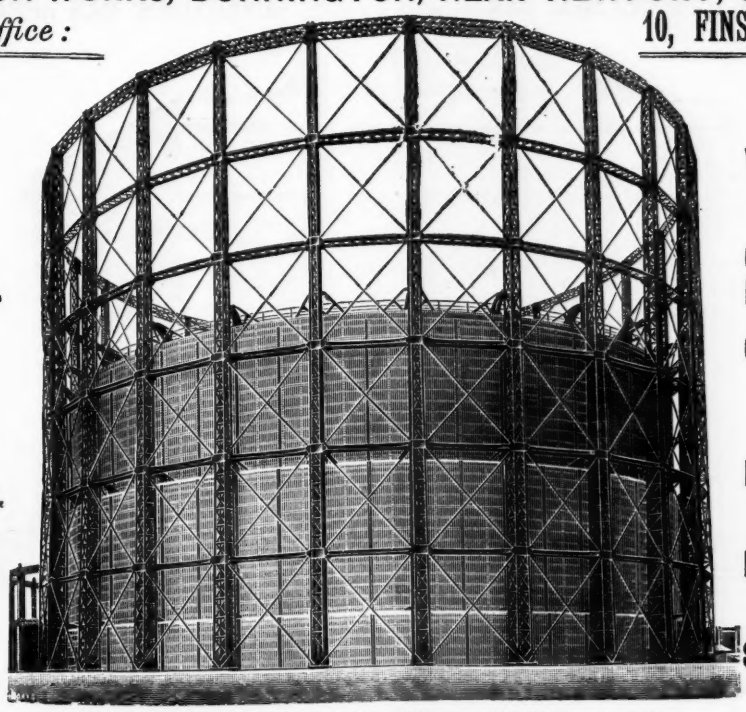
SULPHATE OF AMMONIA PLANT.



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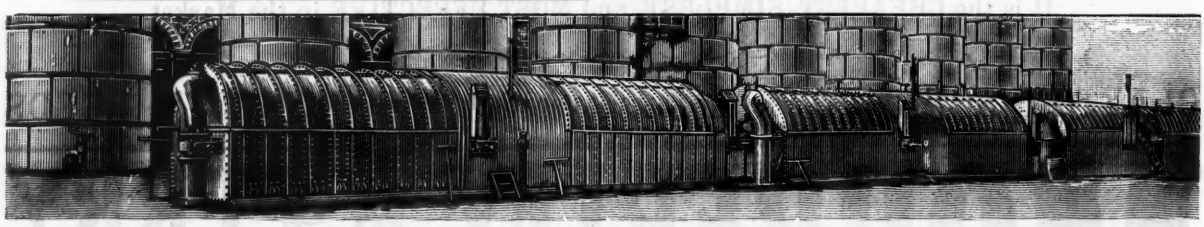
PATENT "STANDARD" WASHER-SCRUBBER

☛ **484** of these Machines (capable of dealing with **464,490,000** cubic feet of Gas daily) in use, which fact is given as evidence of this apparatus being the Most Efficient of any in the Market for the extraction of Ammonia, Carbonic Acid, and Sulphuretted Hydrogen from Coal Gas.



View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company have **30** of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and Abroad.

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SQUARE STATION METERS WITH PLANED JOINTS.

STATION METERS IN CYLINDRICAL CASES.

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RETORTS CAREFULLY PACKED FOR EXPORT.

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INCLUDING

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Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
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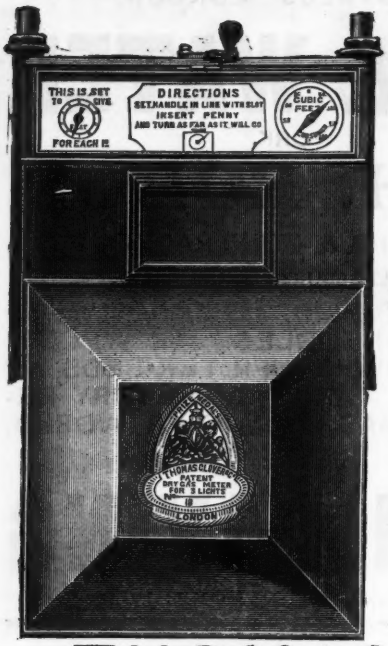

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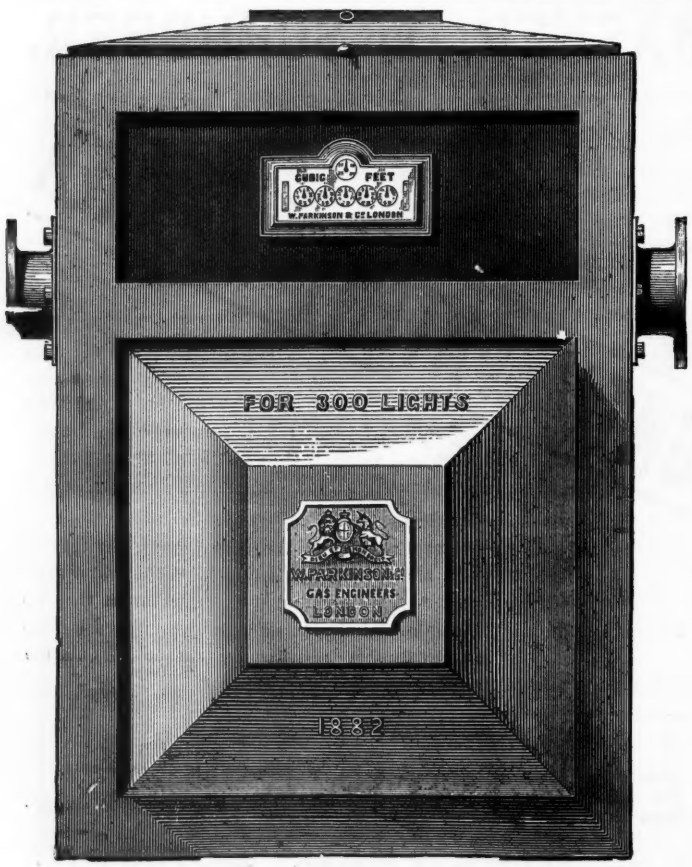

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[See also Advt., p. 568.

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EDITORIAL NOTES.

The "Workman-Director" from Two Points of View.

THE letter in which Mr. George Livesey replies to Colonel Makins's attack on his workman-director project, deserves, like all previous communications on the subject, the most attentive and open-minded consideration. We shall not be accused of unfairness to either in describing the Chairmen of the two largest Metropolitan Gas Companies as one another's antitheses—if the word may be applied to a personality as well as to a figure of speech. Colonel Makins in this case stands for the capitalist, the law, use and wont, and generally for those who, by temperament, training, and conviction, love to stand in the old ways, and take things as they come. Mr. Livesey is the prophet, the projector, the pioneer. When the two principles represented by these gentlemen respectively come into collision, the result is an illustration of the old conception of "an "irresistible force meeting an immovable obstacle." In the present instance, however, matters have not gone to this length. The two representative individuals move in different orbits which do not necessarily intersect at the point of their common interest in the labour question. In themselves, both the lawyer and the prophet may have much justification for their existence. There are times and occasions when it is both right and expedient to remain in the old way, and also when a new departure is correct and desirable. The two industrial organizations for which the respective Chairmen speak, do not at the present time occupy the same plane. Whether for good or for evil, the South Metropolitan Company have already taken a departure for which the Chartered undertaking is far from being prepared; and, proverbially, circumstances alter cases. The only question is as to whether the fresh development urged by Mr. Livesey is, as he declares it to be, the natural outcome of what has been done before. There is a subsidiary question as to when the course he recommends shall be entered upon, and how. Those who dislike the idea will argue that at no time and in no fashion could it be carried into effect. It is necessary for anyone who takes the radical objection to the admission of profit-sharing workmen to the governing body of an undertaking, to show that he understands the principle of profit-sharing, and is prepared to prove that there is no logical connection between this and what Mr. Livesey represents as its further development. If one believes in profit-sharing, it follows that one must believe in everything helping to strengthen and confirm the system.

Now, the chief weakness of profit-sharing as a means of binding workmen to their employers by the bond of a common interest, consists, as we think, in the fact that it is a grant from above, from the same source as the wages come from, and is always open to be withdrawn upon a change of control. The system has other weaknesses; but this which we have stated is the one most likely to deter a clear-sighted workman from accepting it as an equivalent to other means of advancing his own interest which lie within his power to create. In all histories of profit-sharing, one comes across instances where the system has been terminated, after having been found ineffective or unworkable—by whom? By the employer who started it, or his less sympathetic successor. One would like to hear something from the other side on this head; but the other side is voiceless. If a profit-sharing scheme of employment is reinforced by representation on the board of management, there is a strong additional security—not absolute, but still powerful—for continuity of policy. At least, the profit-sharers are no longer voiceless. It may be objected that, in these days of publicity, there would be plenty of voices to give the operatives' version of any industrial dispute; but this would be after the event—a very different matter. The voice chosen to speak before the event would be that of the duly accredited workman-director; afterwards it would be that of the professional agitator.

The South Metropolitan strike, to which Mr. Livesey refers in his letter, has one aspect which has never yet been dwelt upon, much as the subject has been discussed from different points of view. It showed, as Mr. Livesey says, "the absolute necessity of doing something to attach "the workman *to the Company*." The italics are ours. We do not know if Mr. Livesey had, when writing these words, the meaning which we now suggest for them, which is, that the troubles of 1889 showed that mere

personal respect and attachment felt by decent workmen for a good employer, or kindly representatives of a Company, proved insufficient to prevail against the seductions of Trade Unionism. This is really a most important point; and it constitutes the key of the position. There was a gas workers' strike in London before that of 1889; but in those earlier days the sentiment of regard for, and confidence in, individual station managers overcame in some notable instances the temptation to make common cause with their fellows which is natural even to unorganized men. By 1889 this sentiment was overpowered by other influences. The doctrine of the essential antagonism of capital and labour had made such headway, that the men who had been accustomed to be regarded as the fathers of their workpeople were hooted at from the retort-house stages at the instigation of a handful of adventurers. This was what Socialistic and Trade Union theories came to in practice. The moment Socialism and Trade Unionism enter a factory, the former reliance upon mutual good feeling between master and man flies out at the window. It is idle to talk of a good master in the hearing of men who are persuaded that all mastership is intrinsically bad.

What, then, remains? Simply and obviously, the argument of the pocket. For all that Trade Unionists may say for the deceiving of a sentimental public, the claim of Trade Unionism to the support of workmen is solely of a pecuniary kind. The Trade Union is a sort of insurance agency to increase and maintain wages, and shorten hours of labour, which amounts to the same thing. The Gas Workers' Union in 1889 meant having another shilling a day all round, to begin with. This was the bait that caught the men, although the issues upon which they came into conflict with their employers were rendered different by force of circumstances. In converting South Metropolitan employees of all grades into profit-sharers, stockholders, and possible directors, what has been done is merely a putting of the heart where the treasure is. If the Union had succeeded in 1889 in obtaining control over all the gas-works of London and the country, there would have been plenty of workmen-directors; only they would not have been shareholders, nor to be found in board-rooms. Beckton would have been managed from the "Wade's Arms;" and all the energies of the Horseferry Road would have been confined to providing money to pay men for working or not working, according to their fancies' dictates. Of course, that emergency is now past; but he is wise who takes the opportunity of a calm for making things safe against an hour of peril. For whatever we do not know about the working out of labour questions, we can at least be certain that they never recur after long intervals of time in exactly the same form, to be dealt with by the same remedies.

Board of Trade Inquiry at Newark.

It is not often that the affairs of a gas company are gone into so thoroughly before a Board of Trade Inspector as were those of the Newark Gas Company, as will be seen from our report of the proceedings in another column. The Company have done very fairly well, in their degree, since their foundation in 1833—almost too well, in some respects, since a little matter of undistributed profits which it was proposed to capitalize gave some trouble, as such hoards generally do. Mr. Corbet Woodall, who appeared for the Corporation, distinguished himself by discovering a novel application for the money in question. He suggested that it should be carried into the undertaking in the same way as premium capital, bearing no interest. As the money was provided by the consumers of the past, who must have paid so much more than they should have been charged for gas, the important thing was to prevent the Directors of the present or future from being in a position to distribute it among the shareholders. Mr. Woodall's idea was certainly ingenious; and it did not meet with any opposition. There was a conflict of opinion between Mr. Woodall and Mr. G. Livesey over the initial price; the former contending that it ought not to be more than the actual selling price, while the latter supported a certain margin. Mr. Woodall argued that as, during a great number of years, the Company had paid maximum dividends, and filled up their reserve fund, besides accumulating a neat sum in undivided profits, they ought to do very well at the existing selling price. This contention, however, was open to the objection that it does not follow that what can be done now, or has been done in the past, can always be accomplished in the future. We agree with the proposition that too high an initial price is an evil, even for the undertaking that succeeds in getting it. All the same, to say that an existing selling price shall always be taken as indicating a safe initial price, is going too far. The difficulty can only be overcome in one way that we know of, which is the device of the so-called "neutral zone." With this solitary point excepted, the inquiry appears to have been highly successful in clearing up the matters at issue between the various interested parties; and thus one of the best aspects of the Gas and Water Works Facilities Act, and the Board of Trade procedure under it, was once more illustrated.

A Point under the Borough Funds Act.

The Corporation of Dublin have had an unpleasant experience in connection with their Bill in Parliament, to which reference has been made in previous issues of the Journal; and they propose to try and save themselves by having recourse to an expedient which is extraordinary, if not illegal. It will be remembered that the Bill, which is supposed to be an Improvement Bill, contains a number of proposals which have never commanded the approval of the Dublin public; and the only means which the majority of the Corporation could think of to make it more popular, was to wedge in a few clauses aimed directly at the Gas Company. There was never the smallest probability that Parliament would sanction these clauses; but this did not matter, so long as the Corporation could sweeten their Bill by promising the ratepayers that it would enable them to "bleed" the Company to the extent of some £80,000 a year. The Bill proved to want a vast deal of sweetening, however; and notwithstanding the vehement appeals of the Lord Mayor and his party on the Corporation, a poll of the ratepayers was demanded; and in due course it was taken under the provisions of the Borough Funds Act. The result was most disastrous to the promoters of the measure; for consent to go on with it was refused by a substantial majority of those who took the trouble to vote. The result spread consternation among the earnest democrats of the Corporation, who can so little bring themselves to believe that any scheme of theirs could be disapproved of by the ratepayers, that they actually propose to take a second poll, in order that the people of Dublin may have an opportunity of coming to their senses in this regard. This is the way of the most democratic of governments. The will of the people is held to be law, so long as it does not go against the wishes of the party in office. The instant this happens, however, the tune is changed, and the ignorant voters are not supposed to know what they are doing, or else bribery and undue influence are freely charged against somebody. In the case in point, the Dublin Corporation excuse their demand for a second poll on the absurd pretence, among others, that the Gas Company must have "got at" the ratepayers in some way. Fancy a gas company capable of beating a municipality on a popular vote! It is a rash thing to offer an interpretation of an Act of Parliament; but we should unhesitatingly declare that where an Act says that a poll of ratepayers shall be taken, it means one poll, and not two or half-a-dozen polls. It would be an utterly outrageous and ridiculous thing if a corporation could order poll after poll of the ratepayers until a desired vote was obtained. Let the Dublin Corporation, or a party of this body, put themselves upon record as ordering a second poll upon their Bill; and if this results as they wish, and they accordingly proceed with the measure, what is to prevent the fact being used to procure its rejection on the second reading, and to secure the surcharging of all the expenses thus illegally incurred upon those really responsible for it? The whole proceeding is a travesty of local self-government.

Gas and Electricity Leakages.

Our electrical contemporaries and the various interests that are involved in the maintenance of the present systems of electrical distribution in London are "tumbling "over themselves" in their eagerness to fix upon the Gas Companies all the blame for the recent street conduit explosions. The St. Pancras Vestry have implored the Board of Trade to do something to the wicked Gas Company, who are the first cause of all these troubles by not keeping their gas inside the pipes; and the *Electrician* of the 1st inst. lamented that "it is most unfortunate that "no energetic and practical Government Department

"exists which can bring the primary culprits—the Gas "Companies—to their senses." And the last number of the *Electrical Review* concludes that "until we can "compel the Gas Companies to prevent the escape of "coal gas from their mains, any means which electricians "adopt will probably be only palliative, not preventive." We can assure our electrical contemporaries that any advice that can be warranted to reduce the loss of gas that undoubtedly goes on in some parts of every distributing system constantly maintained under pressure will be thankfully received and acted upon, if possible, by those to whom every leak stopped means coal saved. But is there no such thing as leakage of electricity? One of these indignant journals admits that a good deal is left to be desired in the insulation of the St. Pancras electricity mains; and really, in a matter of this kind, "what is "sauce for the goose is sauce for the gander." If the brand-new, up-to-date, ultra-scientific electricians cannot keep their child from straying, it is a little hard that abuse for truancy should be heaped by the same people upon the poor old gas, which has had such a comparatively rough education. There is another funny thing about this fury of the electricians. They do not agree with each other as to the character of the part which it is impossible to deny that electricity plays in bringing about the street explosions. The *Electrician* not only accepts the sodium theory, but records the fact that "we saw a specimen "of this, excrescent on a fragment of stoneware insulator. "A spoonful of cold water was thrown on it, and flames "shot out. The experiment had been already repeated "many times on this same specimen." This testimony is clear and positive enough. The next issue of the rival publication, however, endeavours to ridicule the whole theory and the demonstration, on the not very convincing ground that, if sodium were made in an electrical conduit, such regions are far too damp for it to keep. In such a hurry, indeed, is the *Electrical Review* to wither its "esteemed contemporary" with sarcasm, that it puts it in the singular in one line and in the plural in the next, which is confusing, and spoils the effect. Candidly, we prefer the "specimen" and the "spoonful of cold water" vouched for by one journal, to the lofty scientific *non possumus* of the other. We do not forget that the same authority sought in the same style to argue that the Welsbach burner must be a fraud, because it is claimed to yield more light than a flat-flame burner while consuming less gas; and we were told that this was impossible. We must leave these two interesting publications to reconcile their discrepancies, or to leave them alone; but we do say that if the St. Pancras Electric Lighting Committee continue to make, in street conduits, lumps of a stuff which shoots out flames when a drop of water falls upon it, there may yet be lively times in those parts, irrespective of anything the Gas Company may or may not do to or with their mains.

Progressivism at a Discount.

THE result of the recent London County Council elections may be most properly described as a sharp rebuff to what is known as Progressivism in municipal politics. In so far as the contest was conducted upon party political lines, it is beyond our criticism. It is, of course, on the face of it, a ridiculous thing to import such considerations into municipal and local government; but experience goes to show that, unless something of the kind is done, it is practically impossible to get a respectable poll. So far as London is concerned, the County Council election teaches precisely the same lesson as the School Board election which preceded it. As we and many others understand the results in both cases, they were an emphatic reminder to the men who undertake the business of local government to attend to business, and keep clear of "faddism." There can be no denying the generally good intentions, and the energy and devotion to what they conceived to be their duty, shown by the extremists who have incurred the censure of the Metropolitan ratepayers; but their losses at the polls must show them that they misunderstood the public mind. The bitterest disappointment of the Progressives in regard to the election was not that their opponents gained an increased measure of support, but that they themselves lost heavily. If these gentlemen are consistent socialists or democrats, and are persuaded of the accuracy of the "people's" choice in matters of government, they will, of course, make common cause with the Moderates in carrying out the policy which the ratepayers prefer. The most satisfactory result of the election, from our point of view, is the evidence it affords of the hopeless weakness, as an influence in municipal politics, of pure and unadulterated Socialism and New Trade Unionism. What with cheap newspapers, mass meetings, and other aids to the rapid attainment of notoriety, it is possible for a good many mountebanks of the "Independent of Labour" brand to work themselves into a kind of celebrity. To hear them, one might imagine that the Pete Currans and the Yallops commanded legions of followers prepared to go through fire and water at their behest. But when it comes to the test of a municipal election, even a working-class constituency will have nothing to do with them. The parties on the London County Council are now almost exactly balanced; and if the members are the sensible men they may safely be taken for, they will agree upon a common programme of administration. Progress there will and should be; but Progressivism will be discredited for the lifetime of the present Council, not so much because its opponents are strong, as because it has failed to receive the "mandate" of the ratepayers. This means a respite of many interests and causes from the attacks that have been commenced or threatened against them during the past few years; and if the pause teaches our perfervid Socialists that English people have no love for "dreamers of dreams" which have no basis of truth, and can never be realized, it will not be time lost. Municipal administration, like factory legislation, must progress unceasingly in order to keep abreast of public opinion; but the course of public opinion is not always in the way that agitators and demagogues who pretend to the exclusive possession of all the virtues, think it is going.

WATER AND SANITARY AFFAIRS.

WHEN the debate on Mr. Stuart's proposed instruction to the Select Committee on the Lambeth Water (Transfer) Bill was resumed in the Commons at the beginning of last week, the House showed a disposition to hesitate over the subject, in face of the unexpected result of the County Council election on the previous Saturday. Mr. Bartley remarked that "matters had somewhat "changed," and that the House was no longer able to rely on the *ipse dixit* of Mr. Stuart. Mr. Jackson said "some confusion seemed to exist," and suggested that the business should stand over for a day or two. This was agreed to; and the debate was resumed on Thursday, when an instruction was adopted enabling the several Metropolitan Water Companies to appear in opposition to the Bill, together with county councils, district councils, local authorities, and "any other person" praying to be heard as being affected by the measure. A similar motion was adopted with respect to the Southwark and Vauxhall Bill, and now attention is turned to what may transpire at the meeting of the County Council at Spring Gardens to-day. Mr. Charles Harrison has declared that the policy of the Council will not undergo any change; the Water Bills will also be proceeded with; and everything will go on as before. It is apparent, however, that some change will take place, but to what extent it is difficult to predict. The situation is fraught with uncertainties, though with regard to the water supply there is now a far better prospect that this question will be dealt with in a reasonable spirit, than there was when the Progressives were able to rule everything with a high hand. The *status quo ante* is not to be maintained, otherwise the judgment which London has lately pronounced by its votes simply goes for nothing.

The Money Article in *The Times* last Wednesday, in the course of some remarks relative to the rise in the market price of the London Water Companies' securities, contained a censure on the Directors for what were designated "the ridiculously alarmist circulars" issued by them to the shareholders a short time back, thereby "frightening "investors out of their debenture and preference stocks, "which Parliament deliberately selected only a few years "ago as sufficiently safe for investment by trustees." It is admitted that the ordinary stocks of the Companies might suffer; but it is contended that the debentures were safe. That they ought to be safe is clear; but that they are safe when coming under the influence of the County Council is not so certain. On the occasion of the second reading of the first of the Transfer Bills, *The*

Times spoke out on the subject in its leading columns, remarking that, as the case previously stood, the debenture-holders were "absolutely safe." In the next sentence came the question: "How will it be when the manage-" ment of the London Water Supply has been transferred " to new hands?" The debenture-holders, it was argued, would remain dependent, as before, on the profits of the undertakings; but *The Times* went on to say: "The " County Council may quite possibly care little or nothing " about profits." The contingency was apparent that the Council might serve its constituents by supplying water on terms which would be absolutely unprofitable. " If it does this," said *The Times*, "what security will " the debenture-holders have for the payment of their " fixed charges?" The situation is unmistakable; and the writer of the Money Article in the leading journal is found at variance with his Editor, as well as with the facts of the case. The circulars issued by the Directors were not "ridiculous;" and it is well that attention has been called to this particular danger arising out of the headlong tactics of the Progressive party.

Mr. Commissioner Kerr was quite in his element on Friday last, in the City of London Court, on the hearing of a summons against the East London Water Company. The learned gentleman possesses great powers of censure. If he were to find something to praise, the general public accustomed to his well-known vein would be surprised and shocked. Certainly there was no praise for the East London Water Company. It did not seem to enter the judicial mind that there could be anything to say for the Company by way of excuse or explanation in regard to the facts alleged by the plaintiff. Mr. Commissioner Kerr sighed quite pathetically for the coming of an autocrat—what worthier autocrat could you have than the Commissioner himself?—who would inquire into a thing "and settle " it on the spot." Possibly the East London Water Company, and water companies in general, may find some consolation in the fact that they do not absorb all the abundant supply of the learned gentleman's scorn and indignation. The Commissioner always reserves a good deal of it for the "betterment" of the legal profession; and, on the occasion referred to, condemnation was rateably apportioned between the water companies and the whole body of lawyers.

Institution of Civil Engineers.—At the monthly ballot for membership of the Institution last Tuesday, Mr. Alexander Crombie Humphreys (of Messrs. Humphreys and Glasgow) was elected a member.

Mr. R. Watson, Assistant at the Newbury Gas-Works, has been appointed Manager and Secretary of the Hertford Gas Company. This situation was advertised under No. 2479, in the JOURNAL for the 12th ult.

Mr. Alfred Giles, a Past-President of the Institution of Civil Engineers, died on the 3rd inst., in his 79th year. Mr. Giles represented Southampton in the Conservative interest from 1878 to 1880, and again from 1883 to 1892.

Deaths of Two German Water Engineers.—Herr B. Salbach, of Dresden, a well-known consulting engineer, and constructor of many important town water-works in Germany, whose death was recorded in a recent number of the *Journal für Gasbeleuchtung*, was the author of many pamphlets on the water question, and of an instructive work on the water supply to dwelling-houses, which passed through two editions. Herr J. Müller, of Darmstadt, whose decease has also been lately announced, had supervised the erection of the new water-works for that town completed a short time since.

Death of Mr. T. Giles, of Bridport.—We regret to have to record the death of Mr. Thomas Giles, of Bridport, which occurred on Thursday last, from cancer in the throat. The deceased was an enthusiastic supporter of Gas Managers' Associations; and he became a member of the British Association of Gas Managers in the second year of its existence. He also joined the South-West of England District Association of Gas Managers on its formation, and continued a warm supporter of both Associations. Being of a retiring—it might be said shy—disposition, he rarely spoke at the meetings; but he always commanded a good hearing when he did so; showing a clear grasp of his subject, and an intimate acquaintance with the progress of gas engineering. He preferred the informal conversation and friendly gatherings; and he was well known to many who will join in regretting his loss. For a number of years he was Manager of the gas-works at Cowes; resigning that position about fifteen years ago to take the appointment of Manager and Secretary of the Bridport Gas Company. Thoroughly straightforward and genuine in character, ever ready to do a kind action, he commanded the esteem and respect of his fellow-townsmen and neighbours.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 558.)

THE general tendency in most departments of the Stock Exchange was far from bright last week. Markets for the most part opened fairly; but they could not last, and became quite dull. Prices in general show a falling off; the greatest depression being in American and Canadian, and especially the latter. The Kaffir market, which moves independently, must, of course, be excepted. The position of the Money Market has fallen back to where it was a fortnight ago, with no prospect of anything more than a brief and slight fillip now and then. Business in gas was only moderately brisk, although on one or two days there was a better show of activity. The general tendency was much about the same as in the preceding week; everything being very firm, except Gaslight "A" and Imperial Continental, which underwent a further relapse. The former opened at 269¾; and a good many transactions ensued at rather shrinking figures. As the week progressed, prices continued to fall away; and on the closing day, stock changed hands more than once at 263. The secured issues did not seem to command quite such good prices as of late, though there was scarcely anything definite enough to point to an actual fall. Transactions in South Metropolitans were not numerous; but all three issues improved upon their already magnificent prices. Nothing was marked in Commercials, except a couple of deals in the debenture at about the middle price. The Directors propose dividends at the rates of 13½ and 10½ per cent. for the last half year. These rates are ½ per cent. better than those for the previous half year, and 1 per cent. than the rates declared a year ago; and the quotations of both stocks have risen in consequence. The Suburban and Provincial Companies are still very inactive; the choicest stocks being scarce. The only change in price was a further advance in British. The Continental group was also rather more quiet than usual. Imperial continued to show a tendency to weakness; but Union goes on improving. None of the rest came into prominent notice. The recovery in Water stocks proceeded merrily; and the timid proprietors who a fortnight ago were rushing in to sell may now reflect sadly on their folly.

The daily operations were: Business in Gas on Monday was almost confined to Gaslight "A," which began to waver; but no quotations moved. The Water Companies were very active and buoyant. Southwark rose 3½; Lambeth 7 per cent., 2; and East London, Grand Junction, and West Middlesex, 1 each. Gas was fairly active on Tuesday, with general firmness, except in Gaslights and Imperial. The latter fell 2; but Continental Union was 2 higher. Water rose freely. Chelsea and East London gained 5 each; West Middlesex and Southwark "D," 4 each; ditto ordinary and both Lambeths, 2 each; and Grand Junction, 1. Wednesday was quieter. Gaslight "A" fell 2; but British rose ½. New River debenture went up 3½. Gas was good on Thursday, except the two Companies already mentioned as weaker. Commercial new and South Metropolitan "A" advanced 5 each; and ditto "B," 1. Friday's business was much quieter. Commercial old rose 5; and ditto new, 3. Gaslight "A" fell 2. Saturday's business was nearly all in Gaslight "A," which dropped 1 more. South Metropolitan "C" advanced 2.

ELECTRIC LIGHTING MEMORANDA.

The Cost of Lighting the Birmingham Technical School—An Extra Bill for Worcester—Low-Tension Successes—The Latest Electrical Speciality.

THERE will eventually be some instructive figures to come before the public with reference to the cost of electric lighting for the new Birmingham Technical School. This establishment is a very big affair, even for a Municipality not given to doing things by halves. It appears that the School Committee had made up their minds to have the building, which contains 116 rooms, lit by electricity, regardless of the expense; and this decision was sharply criticized at a recent meeting of the City Council, when it was pointed out that the Gas Department were willing to light the school with ordinary flat-flame burners for £892, or with incandescent burners for £1383. For the electric lighting equipment, the highest tender received at the time was £20,510; and the lowest, which it was proposed to accept, was £13,226. In face of this difference of cost, the School Committee were asked to give reasons for their preference of the more expensive system; and they offered an explanation couched in the usual phrases about the superior healthfulness of electric lighting, and claimed that to have electric plant in the school would be advantageous in an educational way. The final argument on this side was that when once the plant was in, the running expenses of electric lighting, made on the premises, would be very little, if any, dearer than gas. The comparison was stated to be as between a gas bill of £575 per annum, and electricity at £656. It would be interesting to know what the latter figure would cover. The Committee have revised their specification for the electric lighting plant, and propose to begin with an outlay of about £6000. This probably means that they wish to spare the feelings of the Council by spreading the estimated cost over several votes. The long and short of

the matter is that the School Committee desire to have the electric light because it is fashionable, up-to-date, and generally smart and high-sounding; and they will in all probability eventually carry the Council with them on this ground, though they did not do so last Tuesday. The job will, however, be unlike any other of the kind that has ever been heard of, if the actual cost does not amount in the end to a good deal more than the estimate.

The last paragraph receives a good illustration in the experience of the Electricity Committee of the Worcester Corporation. We have already commented upon the peculiar character of the Worcester electric lighting works, in which the idea of utilizing water power has been carried out at a fancy figure; and now the Committee are "brought up all standing" by a little bill of about £5476 for "extras." They have passed a resolution ordering the City Engineer not to sign any more certificates or other documents in connection with the contract for the electricity-generating station. This is a strong measure, and likely to lead to trouble. Meanwhile, in consequence of the arrangement entered into when the job was begun, the Committee find that all amounts already certified by the City Engineer and the Quantity Surveyor as due to the Contractor must be paid. The Committee's report on the subject is full of expressions of "deep regret" that this and certain other things were done by their officers without notice to the Committee; and altogether the people of Worcester are likely to find they must pay pretty smartly for the "enterprise" of their Corporation. This is the one thing certain about municipal electric lighting ventures; while the doubt as to whether they are worth going into cannot be said to have been satisfactorily resolved anywhere.

The last remark is supported by some observations of the *Electrician*, which recently admitted that "the energy and the thoroughness with which our English municipalities have assumed the function of supplying electric current to all who may desire and can pay for it, is at once an unique and an interesting phenomenon." Our contemporary went on to observe upon this; "whether the venture will prove, firstly, a sound financial success, and, secondly, a matter for general congratulation, time alone—and, in regard to the latter consideration only a very long time—can show." It is acknowledged that the financial and engineering success of the leading London low-tension companies is assured, which is a somewhat remarkable admission for a modern electrician to make, seeing that low-tension systems are now supposed to be somewhat old-fashioned. But then the territory served by these companies includes the very cream, not merely of the residential, but also of the fashionable and the pleasure portions of the Metropolis. The worst of this method of electrical distribution is that the generating station must be in the middle of, or very close to, the district of supply, which means expense in working and an occasional "nuisance" lawsuit. Neither the low nor the high pressure systems can claim immunity from that latest plague of electricians, the junction-box explosion, and the choice between them must be dictated by considerations of local expediency; for in certain circumstances either will do equally well, or ill.

The latest thing in electrical specialities is an invention claimed by several ingenious gentlemen for thawing water service-pipes by electricity. The object is one that must appeal very strongly just now to a large number of afflicted householders, whose most obvious connection with the town's waterworks is the rate-paper. The idea is to insert a thin wire of high electrical resistance in the water-pipe, so that when a frost comes and the water ceases to flow, a current can be sent through the wire with the result of heating it and thawing the ice. Mr. Bidder, Q.C., has a device which Messrs. Drake and Graham, writing to the *Electrical Review*, suggest might be adopted in connection with the high-resistance wire. It is that of an india-rubber tube filled with air, drawn through the water-pipe with the object of providing something compressible in the event of the water freezing solid and consequently expanding. As the writers say, with pipes protected in this way a householder could go to rest in the winter time with an easy mind; for if his pipes froze, they could not burst, and if electricity were not obtainable on the spot to prevent freezing, the use of a few storage cells would thaw the pipes in a few minutes. It is a golden dream; but one can picture the contempt with which the plumber and the householder would in the summer time receive any suggestion for saving trouble that may be expected to come to pass every fifth winter or so. And what would be the state of mind of a careful person who should put himself to the pains of exercising all this forethought, only to find that, when needed, the air-pipe had let in water, and the electric wire had developed a fault, and refused to act!

Gas and Water Companies' Dividends.—The Directors of the Commercial Gas Company recommend dividends at the rates of 13½ per cent. on the old stock, and 10½ per cent. on the new stock, less income-tax, for the half year ended Dec. 31 last. A dividend at the rate of 10 per cent. per annum is recommended, by the Directors of the British Gaslight Company for this period in addition to a bonus of 2s. 6d. per share. The Directors of the East London Water Company recommend a dividend at the rate of 8 per cent. per annum for the past half year; leaving an unappropriated balance of £18,060.

GAS WORKERS AND OLD-AGE PENSIONS.

It is time now that the councils and members of the national associations of gas engineers addressed themselves seriously to the solution of the question of what is to be the principal pabulum to be offered at the approaching summer meetings of the respective organizations. We shall not render ourselves liable to be reproached for favouritism, if we assert that this is a question which concerns every British gas engineer and manager who is concerned for the reputation of the particular technical society which he individually affects. It is too much the habit of the ordinary run of members of such associations to leave to the officers and the council for the year the onerous, and generally thankless, duty of providing papers and arranging for the matters which are to justify the holding of the annual meetings; and it is with the desire to lighten their labours in this regard, that we now call our readers' attention to the whole subject. For the credit of British gas engineering, it is desirable that a high quality and a fair quantity of technical communications should be forthcoming for the May and the June gatherings. It is also desirable that the Councils should not be put to the painful necessity of accepting anything and everything in the shape of a paper that may be submitted to them, and especially that the well-known "free horses" of the profession in the matter of paper-writing should not be worked to death. The sources from which papers are obtained should be various. Some reasoned contributions from the seniors in service are needed, as well as others from workers with their reputation to make and their authority to establish. One does not like to think of the honourable order of "past masters" as so many "extinct volcanoes." They should be heard from sometimes; and not only in the guise of critics of other men's proposals, although criticism is one of the proper exercises of the engineer. Then the young men ought to realize to a greater extent than they do the educational and —not to use the term in any bad sense—the advertising value to the author, of a really good paper. There is no surer way of showing how much, or how little, one really understands of a subject than by writing about it; and since every man embraces a profession with the intention of living by, and if possible making a name in it, and leaving it the better for his life-work, the opportunity of contributing to the literature of the profession is not to be neglected by whomsoever would shine among its followers. Lastly, the assistance of competent outsiders or quasi-professionals is not to be despised or foregone, for history abundantly proves that some of the most fruitful suggestions that help to develop the arts and industries of this and other countries may come from those who might be described as bystanders.

We do not propose to discuss in the present article any of the technical aspects of the gas industry which might be regarded as suitable and timely for presentation before the Institution or the Institute. Just at the present moment, there is another order of subjects very much before the public, and in regard to which many unsolved questions are actually pressing themselves upon the public mind. These are the various topics generically grouped under the name of Labour politics. Some of us may feel inclined to protest that too much is heard of these topics; but, protest as much as we please, we cannot get rid of this Sphinx that lies over against the highroad of modern industrial progress. The atmosphere is full of queries arising out of the actualities of labour, as well as the relations of labour to capital, of employed to employers. Parliament is seized of them; the Government of the country is trying to deal with some of them; and on every hand corporate and private employers are occupied with the treatment, according to their lights, of the labour uestions lying nearest to them.

The gas industry of the United Kingdon has always been deeply interested in all questions concerning labour; and long before the sense of the obligation to deal in a liberal spirit with such matters was generally recognized among employers and by the public, gas managers initiated most of the great reforms with a view to improving the condition of the unskilled working man which stand to-day in the fore front of the programme of professed reformers. A wise and learned writer upon these particular matters has stated—and it is almost the only blot upon his book—that employers have never granted any boon to labour until forced thereto by organized workers. Speaking for the gas industry alone, this statement is an error, and a bad one. An eight-hour day, pension, provident, and accident funds; free holidays; the remission of Sunday labour in a continuous industry—these, and other boons to workmen, were given to labourers in gas-works without compulsion, and before they were ever asked for. Of course, this was rendered possible by the fact of gas supply to British towns being a protected industry—one of those so-called "monopolies," in short, against which a shallow public opinion occasionally declares itself. It might, and did, require Factory Acts to constrain manufacturers engaged in competitive production, and brought up in the faith of the "hard-shell" political economists, to observe the dictates of humanity in their labour arrangements; but gas companies have always felt themselves in a position to act liberally towards their employees, and many, perhaps most, have done so.

If, as Sir Henry James remarked the other day in the House of Commons, it is of the nature of factory legislation to be progressive, so as to keep pace with public opinion—and the

truth of the observation lies on its surface—so much the more is it certain that the policy of employers who have never needed to be controlled by such legislation in their dealings with their own people must move forward with the times. It so happens that the manner in which one prominent employer of gas workers thinks it desirable to interpret the signs and satisfy the demands of the times, has been recently discussed in the columns of the JOURNAL. Whether we think Mr. Livesey's views in this regard as just, or the contrary, it cannot be denied that they stand as the indication of the working of a spirit which we may all rejoice to recognize as born in a gas-works—the spirit of generous, spontaneous liberality in interpreting the mutual obligations of employers and employed. No organized bands of labourers have forced Mr. Livesey's hand in this respect. He, and those with whom he has been associated in the supply of gas in the south of London, and those whom his Company succeeded, have never been anything else than generous, kindly-intentioned employers of labourers of many degrees, among whom occurred some of the roughest of rough diamonds. It should not be forgotten that in their day of independence, other South London Gas Companies now absorbed in the South Metropolitan, were known as friends of the working man; and Mr. Livesey would be the first to admit that in carrying out a progressive labour policy he is but, to a large extent, acting on lines traced out before his administrative power attained its present range. We say this with no intention of detracting from the reputation for originality and humanity which has long attached to Mr. Livesey's name, or of trying to make anybody else responsible for his latest project. The reminiscence helps to show, however, why it is that South London is the originating centre of much of the advanced policy of the hour in regard to the treatment of gas workers.

Although Mr. George Livesey's schemes are likely to be much discussed, publicly or privately, at the next general meetings of gas managers, and may very properly be brought before the Institution with which he is more specially identified, as an authoritative communication on a matter of current interest to followers of the industry, we do not expect them to be discussed in anything more than a complimentary fashion at a gathering of this nature. There are plenty of sufficiently obvious reasons for this opinion; and we shall be supported by all professional readers in holding that, if Mr. Livesey's "Workman-Director" proposal is brought before the Institution, there will be nothing else to be done beyond inscribing the communication in the Transactions, giving public expression of the sense of the meeting of the interest of the matter and the good faith of the author, and "passing to the next order of the day." Salaried gas managers are not free to say yea or nay to a proposal of such a kind, and will therefore naturally prefer to keep silence.

Apart from this particular point in the contemporary Labour problem, there is something that may very well and fitly be brought before a national association of gas managers. This is the gas-works case in connection with the subject of Old-Age Pensions. Whatever may be thought as to the practicability of Mr. J. Chamberlain's and other theories upon the manner in which provision can be made for the old age of deserving persons of the working-class generally, it is evident that the most promising way to attack a problem of this kind is to take it in detail; every industry doing what it can to make due provision for its worn-out implements. Dr. Flint, whose suggestive book upon Socialism was recently appreciated in these columns, is very strong upon the duty which lies, morally at least, upon those employers of labour who have prospered in an industry, to recognize in a special way their indebtedness to those by virtue of whose toil their fortunes were made. He argues very well that much of the seething discontent that exists among certain orders of workpeople would be cured if, say, one or two of the millionaires who from time to time arise in different industrial circles would devote their spare means to the benefit of their workpeople. It would be better for them to do this in some sensible way during their lifetime, than leave their millions to be squandered after their death by silly heirs of the "plunger" type, with whose doings the world is unhappily only too familiar. But there is no need in the gas industry to invoke the infrequent and unsatisfactory millionaire. Every gas company and municipal corporation owning gas property have it within their power to take care of their own human "scrap," and keep it safe from that sorry waste-heap, the workhouse. Many do so, only there is no agreement among them as to ways and systems.

This is what it is certainly within the power of associated and "incorporated" gas managers to alter and improve. There is small use in being "incorporated" in one body, if every gas manager is practically bidding in the labour market against his brother, through some superior advantage in his scale of pay and allowances. Rates of wages naturally vary somewhat in different parts of the country, although there is probably not much difference in the wages of gas stokers. Gas managers vie with one another in the matter of cutting down the cost of carbonizing labour, but not in beating down the labourer's rate of hire—indeed, as already remarked, the tendency is rather the other way. Why should not the power of the Institution and of the Institute be exercised in the formation of something like a consensus of opinion respecting the requirements of a gas worker's pension fund? There is no statutory facility for carrying out the project that has been suggested of making all gas workers chargeable upon a common old-age pension fund towards which periods of service in any gas-works would be allowed to count. This plan, even if practicable, would be open to the objection of encouraging the migratory habit in gas stokers, which is already troublesome enough in regions where gas-works lie pretty thickly together. There should be no sort of inducement offered to a man to quit his job; but, on the other hand, he should not be put into a state of slavery to his employers for the sake of his pension.

These are points to be arranged; and they could be arranged among gas administrators, if the latter would put their hearts into the task as they do into the work of making dividends. Men may be instant upon dividends, however, without forgetting their responsibility in regard to helping forward the solution of the grand problem of the age. If one looks at such a problem as a whole, human wit and capacity fail before the immensity and the complexity of it. When one turns to study the side which is nearest, the prospect is not nearly so formidable. This is the opportunity which now lies at the command of the associated and incorporated gas managers of the United Kingdom; and the least they can do is to find one of their number willing to look into the matter, and put it into a shape for his fellows to talk about.

GEORGE FLINTOFF.

THE unusually long list of deaths in *The Times* last Friday contained a name which was one to conjure with in a not very remote period in the history of gas supply in the United Kingdom. It was that of George Flintoff, who died at his residence in Abbey Road, St. John's Wood, on the 3rd inst., in his 76th year. The late Mr. Flintoff was a persistent gas agitator; and it is somewhat singular that the event above recorded should have happened at a time when London is being stirred by a movement similar to those with which he was so long associated. George Flintoff—"George Flintoff, C.E.," as he generally styled himself—was a bookseller and publisher in Fleet Street; and one fine morning he suddenly became conscious that he had a mission. "A man with a mission," wrote the Editor of this JOURNAL in 1859, "is most frequently a great bore, and a public nuisance; and there is no exception to the rule in the case of Mr. Flintoff, who fancies he has a mission to reform the gas supply of the whole kingdom." But at that date the mission was well at work. The writer of these lines does not remember if Mr. Flintoff had any hand in the preparation of the circular with its bundle of faggots and its motto of "Union is Strength" which anteceded the formation of the Great Central Gas Consumers' Company; but, at any rate, he was actively engaged in stirring up the Blackburn folks as far back as 1853. Judging from what appeared in our columns at the time, Mr. Flintoff was able to take on, and readily adapt himself to, various pursuits; for in the number for Sept. 10, 1853, we read: "The trade of 'gas reformer' is a novel one; and requires but little study or preparation. . . A bookseller one year, clerical and scholastic agent another, and gas secretary the third, becomes qualified as gas engineer and reformer the fourth!" As we have said, Mr. Flintoff was agitating at Blackburn in 1853; he was also engaged at Sheffield, where the Consumers' Company was started under his management. Here competition ended in amalgamation; and Mr. Flintoff was left without a job. He then turned his attention to Liverpool, and endeavoured to start a gas company. But here he had to take proceedings to recover payment for his services and also money advanced on behalf of the company which had been provisionally registered. In 1857, he was busy in Dublin as the Secretary of the Gas Consumers' Association; and he reappeared two years later as Secretary of the Independent Gas Consumers' Company of that city. Popular as he was at this time, it seems that he was not eagerly sought after, for we read that "twelve of the largest cities and towns of the kingdom thought proper to dispense with his services, and recommended him to bestow his learning elsewhere." Of course, in his desire to carry his reforms far and wide, he had not neglected Scotland. But the inhabitants of the country north of the Tweed were too "canny" for him; and in 1861 his career in the North was drawing to a close. England, Ireland, and Scotland having been worked, Wales was tried; and so in the year 1862 we find him at Cardiff. Of course, in such a war as Mr. Flintoff was waging, there was a good deal of hard hitting on both sides. For our own part, we had a position to defend; and we defended it to the best of our ability. It must be acknowledged that in doing so our remarks were not, at times, of such a character as to "turn away wrath," but rather to "stir up anger" on the part of our opponents. We consequently find Mr. Flintoff telling the good people at Cardiff that he had "brought seven actions for libel against the JOURNAL OF GAS LIGHTING, and had compelled that vile organ of the gas companies to apologize to him."* The next year, Bristol and Weston-super-Mare were favoured by his attentions. In 1864, the Metropolis was stirred up by a meeting in Paddington, held by order of the London Gas Consumers' Protection Association; and Brighton, Leamington, and

* This assertion, as pointed out in the JOURNAL at the time, was simply one of Mr. Flintoff's "fabulous stories."

Maidstone were among the provincial towns selected for operations. In the following year, and again in 1867, Mr. Flintoff was once more in London; in the latter year addressing a meeting in Exeter Hall. Passing over the intervening years till September, 1872, we find Mr. Flintoff again in the Metropolis on his mission, having this time as a coadjutor Mr. E. Dresser Rogers. The Gas Consumers' Association was still in existence; and it was proposed to introduce in the following session a Bill to "annihilate the present system of gas manufacture and supply, which has become a mockery, a delusion, and a snare." The old method of gas making was to be abolished, and the Eveleigh system adopted; and, of course, the purchase of the undertakings by the Metropolitan Board of Works was advocated. From this time onward, little was heard of Mr. Flintoff. Now he has gone from among us; but his mission remains. Agitation is rife in our midst, as the columns of the last number of the JOURNAL fully testify. In the opening lines of that number we referred to the initiator of the present movement as "a practical politician who has succeeded in discovering and cultivating to some purpose that great requirement of all persons who desire to become personages—a mission." It will be for him to see to it that he does not, by indiscriminate zeal, justify the application to himself of the trenchant words employed by our predecessor nearly forty years ago in regard to one who has now gone to his rest. Since the stirring times in which his work—vigorous and no doubt earnest—here briefly sketched, was done, many changes have taken place in connection with the gas industry of this country; and we venture to think that those of them which have proved most advantageous to the consumers at large have been less the result of popular agitation than of judicious, far-sighted administration.

WHAT ARE WATER-WORKS WORTH?

THE problem, What are the London water-works worth? is likely to exercise a good many minds for some time to come. In order to solve this complex question, the sensible and natural course is to look around for precedents; and there will be no difficulty in finding them. The Progressive County Councillor is, of course, inclined to cry, "A plague on all your precedents;" but, happily, the pugnacious Progressive is not yet absolute master of the situation. His voice is still loud, but not necessarily dominant; and it is absurd to suppose that he will be allowed to buy up the London Water-Works without the discussion of those principles of compensation which have been deliberately adopted as equitable in other cases. Of what was done at Birmingham, we need not speak in detail, because the leading features of the arrangement effected in that city may be gathered from the last number of the JOURNAL. But there are some other precedents which may well be studied. In 1868, the Brighton, Hove, and Preston Water-Works Company sold their undertaking to the Brighton Corporation at the price of 20 years' purchase of the maximum dividend which the Company were entitled to earn and distribute. The actual price ascertained upon this basis amounted to 22½ years' purchase of the dividend that was being paid at the time of sale. In 1872, the Aberdare Board of Health purchased the local water-works at a sum fixed by arbitration, at 22 years' purchase of the net revenue; and in the same year the Lincoln Water-Works were sold to the Local Authority at 23½ years' purchase of the net revenue. These and similar examples were fully discussed in an article which appeared in the JOURNAL for Dec. 15, 1886.

Without multiplying instances on this occasion, it may be said that every purchase marked an upward tendency in price; the maximum being attained by the Stockton and Middlesbrough Water-Works Company, whose case has always been a strong weapon in the armoury of the Companies when threats of buying up were breathed against them. The Stockton and Middlesbrough case still remains, in fact, the leading authority and prime precedent in favour of water-works shareholders. It was the first example of compulsory powers being granted by Parliament for the purchase of such works by a public body; and it furnished forth abundant guidance as to the broad principles of compensation that might be adopted by an Arbitrator of liberal views. Yet the Stockton and Middlesbrough Water-Works were in a notoriously unsatisfactory condition at the time of the purchase. It was shown, indeed, that the Directors had neglected the necessary steps to place the water supply on a proper footing; and when the Joint Corporations took over the undertaking, it was found necessary not merely to pay a gigantic price, but also to raise something like £500,000 for new works alone.

The Act of Parliament was obtained after a prolonged and most expensive battle in the Committee Rooms. It provided that, in addition to the payment of 25 years' purchase of the maximum statutory dividends (which was between £18,000 and £19,000 a year), and the taking over of the statutory debt of the Company—*i.e.*, the mortgages on debentures then existing—the purchasers were to pay "a sum for compulsory sale and for the prospective value of the Company's undertaking." The amount payable under this head was afterwards fixed by arbitration at £213,802—thus making the total purchase-money, exclusive of the statutory debt, equivalent to no less than 36$\frac{4}{10}$ years' purchase of the authorized maximum dividend. Yet, as has been stated above, the works, instead of being in a high state of efficiency, were radically defective, badly managed, and financially in a hopeless muddle. With this example before their eyes, it is hardly surprising perhaps that the London County Council on the one hand, and the Companies on the other, should be very much at issue as to the powers to be conferred upon the potential Arbitrator to whom will be committed the fortunes of the Metropolitan shareholders.

There remains also another precedent of great significance—viz., the purchase of the Sheffield Water-Works, of which, on a future occasion, some further particulars shall be given. It was in connection with the Sheffield purchase that the late Lord Derby, acting as Chairman of a Select Committee of the House of Lords, promulgated the doctrine of "public policy" in favour of placing the control of the water supply in the hands of a public authority—a doctrine which has of late years undoubtedly met with wide acceptation. We need not, however, quarrel with the doctrine unless, like charity, it is to be allowed to cover a multitude of sins. Public policy is one thing, public pillage is another; and public pillage is, unfortunately, the programme of certain of our so-called Progressives. To secure fair play, those who may desire that even the London County Council shall keep their hands from picking and stealing, and be true and just in all their dealings, cannot do better than bring prominently into the foreground the precedents of past times. It need not be urged that such precedents should be slavishly followed; but it must and ought to be contended, with all the force that a just contention can carry, that such precedents should not be swept like rubbish to the void.

Moreover, it is of the first importance to make it clear to the public mind that the Water Question in London is in danger of being settled by those whom it does not in any true sense concern. It is a ratepayers' question; and it should be decided by the ratepayers. But what happened when Sir John Lubbock recently moved his amendment in the House of Commons for the purpose of checking Professor Stuart in his wild career? There were 26 Metropolitan members in favour of the amendment, and only 16 against it. Furthermore, taking the Home Counties, whose interests in the subject are vital, 27 members supported the honourable baronet, and only 3 were found on the other side. Yet the amendment was beaten by an all-round majority of 38. And why? Because Professor Stuart, in striving to rush through this Private Bill, was backed by a mixed brigade from all parts of the Kingdom, whose London interests are *nil*—no less than 80 of the ruling majority being members who represent Scotch, Irish, and Welsh constituencies.

NOTES.

A Home-Made Spectroscope.

In the course of an interesting series of lectures to working men, delivered at the Museum of Practical Geology during the past season, Mr. J. Norman Lockyer described how a simple form of spectroscope can be constructed and used as a means of introduction to the wide regions of research in which this instrument is employed. He remarked that the most complicated and expensive spectroscope simply utilizes the property of a simple glass prism, of breaking up a beam of light of any colour into its constituent parts from the red to the violet. A tiny prism of the kind required can be bought for sixpence. This is to be glued endwise at one end of a piece of wooden lath about a foot long, so that by looking through the prism sideways there can be seen a coloured image of a needle stuck into the opposite end of the lath. If an observation of the needle is taken through the prism while the needle is illuminated by a candle or gas-flame so placed beside it as not to permit of the direct light falling upon the face of the prism, the effect of a complete band of colour from red to blue will be obtained. If the instrument is carried into the sunlight, again taking care that the prism itself is protected from the entrance of any foreign light, and the sunbeam is allowed to illuminate the needle, a spectrum of a different kind, full of black lines, is produced. By such experiments as these, the leading axioms of spectroscopy can be deduced.

Fowler on Boiler Explosions.

In a paper on boiler explosions, recently read by Mr. W. H. Fowler at the Institution of Civil Engineers, it was demonstrated that all the fanciful theories that have been invoked to account for some boiler explosions—such as "deferred ebullition," "dissociation of water," "spheroidal state of the water," and so forth—are superfluous. It was contended that there is nothing occult or mysterious about boiler explosions, which can, as a rule, be traced by patient investigation to the operation of simple and well-known causes. Mr. Fowler also showed that it is the water, rather than the steam, in a boiler which constitutes the source of explosive energy; so that a boiler is dangerous in proportion to the weight of hot water it holds when from any cause it explodes. Prominent among the chief causes of explosion is corrosion of the boiler shell. Some explosions originate in the stresses arising from expansion and contraction due to unequal action of the fire heat. In illustration of this, mention was made of an instance of a boiler exploding two hours after the fires were drawn. A frequent cause of failure was the old practice of cutting large holes in the boiler without providing compensating strengthening rings.

Overheating from shortness of water is a common cause of boiler explosions, but not as the result of turning cold water upon red-hot plates. What happens is that the overheated flues become softened, and are bulged and rent by the ordinary working pressure. Many explosions occur from excessive pressure due to defective safety-valves; and many more from radically faulty materials and construction. Mr. Fowler lays stress on the value of careful hydraulic tests of new work.

Dioptric Lamp-Globes.

Writing in the *Electrical Review* on the subject of the dioptric glass shades for lanterns recently brought out by himself and M. Psaroudaki, M. Blondel remarks that the object of these attempts is the production of a crystal or glass globe which will diffuse light without the losses entailed by the use of opal globes. The inventors wished to be able to make a spherical globe of crystal which should be luminous over the whole of its surface, and should not waste more than 10 to 15 per cent. of the light. In this, they claim to have succeeded. In Blondel and Psaroudaki's holophane globes, the outer flutings are stated to be both refracting and reflecting—the latter office predominating. The advantage of this is that they send out the light at a greater angle of diffusion than the flutings that are simply refractory, and so render the globe bright all over. Besides, there is no fear of the light being clouded by dust, as this does not affect the total reflection. The inside flutings are concave in form—an arrangement which avoids the loss of light by reflection at the entering of the rays into the glass. Two kinds of these globes are made—one to produce equal diffusion of light, for interiors; and the other to send the light down upon the ground, for street-lamps. Experience shows that, for the greater number of artificial lights in modern use, these are the chief *desiderata*. Holophane glasses are made in tulip and cone shapes for incandescent gas-burners; and the patentees state that the Paris Gas Company, having tested these globes and found them to entail a loss of only 13 per cent. of light, now recommend them to all consumers.

The Qualities of Bricks.

Mr. E. S. Fickes, of Steubenville, Ohio, has recently completed an extensive series of experiments upon bricks, intended to ascertain the conditions which go to the constitution of a good article for building purposes; and he has deduced a number of general conclusions from his tests, which may be summarized as follows: The strength of building bricks, both against transverse and crushing stresses, varies in tolerably close inverse ratio with the quantity of water absorbed in 24 hours. The strongest bricks absorb least water. Good building bricks take up from 6 to 12 per cent. of water in 24 hours; and, with no greater absorption than that represented by the latter figure, they will ordinarily show 7000 lbs. to 10,000 lbs. or more per square inch of ultimate crushing strength, and a transverse modulus of 700 lbs. to 1200 lbs. and upwards. Poor building bricks will absorb from one-seventh to one-fourth of their weight of water in 24 hours, and average a little more than half the transverse and crushing strength of good bricks. An immersed brick is nearly saturated in the first hour of immersion. In the remainder of the 24 hours, the absorption is only one-half to four-fifths of 1 per cent. of its weight, as a rule. The strength of the bricks in a kiln is lowest in the top course—increasing rapidly for the first ten or twelve courses, and afterwards more slowly down to the arch bricks. The size of American bricks varies greatly in different parts of the continent; and this circumstance requires to be taken account of by builders. Mr. Fickes thinks that, as a rule, bricks made by the dry press are notably less porous and stronger than those made by the wet process; but there are exceptions to the rule.

The Vacancy at Carlisle.—In response to the invitation of the Corporation of Carlisle, 33 applications have been sent in for the position of Gas and Water Engineer and Manager, rendered vacant by the resignation of Mr. Hepworth. These were considered by the Gas Committee last Thursday, when the list was brought down to five. The Committee will hold another meeting this week, and further reduce the number, before submitting a recommendation to the Council.

The Gas Tramway at Dessau.—We learn from the *Journal für Gasbeleuchtung* that the Dessau tramway, which was described in the JOURNAL a short time since (*ante*, p. 22), acted very satisfactorily during the recent period of severe weather. The longer section continued working throughout; and the cars ran to time. But the shorter section was blocked for a few hours, owing to the grooves of the rails having become completely filled with ice during one night. The minimum temperature experienced was 16° Fahr.; and the greatest depth of snow was 11½ inches. The cars carried snow-ploughs, and ran without interruption through the heaviest snow-falls. The water used for cooling was not found to freeze. The electric tramcars in Germany do not appear to have come off so happily. At Remscheid, Erfurt, and Lubeck, serious stoppages occurred; and at Halle, the subsequent moisture produced by the thaw led to one of the electric cars taking fire. At Dresden also the gas cars gave less trouble than the electric ones during the severe weather.

TECHNICAL RECORD.

THE HEATING OF GREENHOUSES AND CONSERVATORIES BY COAL GAS.

We complete to-day our record of the proceedings at the recent meeting of the Manchester District Institution of Gas Engineers by giving a report of the discussion on the paper bearing the above title which was read at the last November meeting.* The paper was written by Mr. W. R. Chester, the Engineer of the Nottingham Corporation Gas-Works; but, owing to his unavoidable absence on that occasion, the discussion was postponed to the present meeting.

The CHAIRMAN (Mr. Isaac Carr, of Widnes) observed that, as Mr. Chester was unable to be present when the paper was read at the last meeting, he thought they might give him an opportunity of now saying a few words by way of introducing the subject and refreshing their memories.

Mr. CHESTER said he felt he owed an apology to the members for his inability to be present when his paper was read. It was a matter of exceeding regret to him that he was not there to reply to the discussion which would, in all probability, have taken place. But, as a matter of fact, he did not think it was a result they need have any regret about, inasmuch as the time that had elapsed since the paper was laid before the members had produced additional experience in connection with the subject of the heating of greenhouses. They had recently passed through a period of phenomenal severity. During that time, the temperature had continued at about zero point for upwards of a month—certainly for more than a fortnight; and it had tried the efficiency of all kinds of heating apparatus to the utmost extent. The particular one which he had brought before the members had gone through some serious vicissitudes such as demonstrated very clearly what he had already formed a conclusion upon in his own mind, as to the inadequacy of the size of the apparatus which had been put down to warm the greenhouse referred to. But his firm conviction was that, all things taken into consideration—convenience, adaptability, and cleanliness, together with less labour—gas could be applied to the heating of small greenhouses with quite as great an economy as solid fuel. Beyond that he never pretended to go, and never even suggested that gas could be applied on a large scale for horticultural purposes. For greenhouses of moderate size, under the control of people of moderate means, it could be utilized for heating them, from an economical point of view, with quite as much advantage as solid fuel, and with a great deal more convenience. His experiments, he thought, clearly pointed out the practicability of utilizing gas for greenhouse heating; and they equally pointed to the direction in which they ought to go to accomplish successful results. The apparatus he had put down was more of an experimental nature than anything else. It had passed through a period of low temperature such as might be called phenomenal, and it was still in successful operation.

Mr. HARRISON VEEVERS (Dukinfield) thought there was one point which should be strongly impressed in connection with this matter, and that was the reliability of gas as compared with coke or coal fires. He remembered some years ago having a small greenhouse, in which he had carefully kept up a coke fire the whole of the autumn, which happened to be a very mild one. But, being out on Christmas Eve, the fire was not lighted; and that night a frost came, and killed every plant in the place. A gas-fire would not have required looking after; and it would have kept the greenhouse going throughout the winter—and economically, by saving the plants. The reliability of the heating arrangements was an essential point in greenhouses. Solid fuel fires would alter in intensity according to the amount of fuel put into the stove; but with gas-fires one could always maintain, by means of a regulator, the exact heat required.

Mr. C. E. JONES (Chesterfield) remarked that the past winter had been a most unprecedented one. In the part of the country where he resided, they had had 38° of frost; and in some portions of the district in which he supplied water, it had been even as low as 41°. He agreed with the observation of Mr. Chester, that the only way in which frost could be kept out of the house was by using a reliable fuel; and the only reliable fuel was that which gas managers supplied. They could not get a coke or coal fire to burn for ever; but a gas-fire would keep going, without attention, as long as one liked.

Mr. W. W. HUTCHINSON (Barnsley) said that, for a number of years, he had one or two small greenhouses heated by gas. It was found very reliable and convenient; and he could quite endorse the points Mr. Chester had raised in his paper—that there was a minimum of nuisance where gas was employed, and that anyone, young or old, could manage the heating of a greenhouse by it. In thinking over this matter, he had called to mind certain information which reached him some time ago with regard to the severe temperature in Russia. He was told that, in St. Petersburg, they had less interruption of the gas and water supplies to the houses than in this country, and that this arose from the fact that, having very low temperatures to deal with, they provided against them. Now this appeared to him

* See JOURNAL, Vol. LXIV., p. 1021.

to be an important point in connection with greenhouses. Supposing the owner of valuable plants, such as orchids (which meant a large outlay) were to adopt gas for heating, and the temperature dropped as low as it had for the last month or two, if there was a stoppage in the supply, it would be a very serious matter. The temperature in his district had not been quite so low as Mr. Jones had mentioned; but he could quite understand that it might be sufficiently so to freeze up a supply of gas as ordinarily laid on to a greenhouse. It was therefore a matter of great importance to have the service-pipes placed low enough in the ground—say, 3 feet from the surface, because the frost had lately penetrated down some 2 ft. 6 in. or 2 ft. 8 in. The inner attachment should likewise receive careful attention. On the general question, he might say he felt convinced that gas would come into use in greenhouses of moderate dimensions; but it did not seem applicable to large conservatories or houses carried on for trade profit.

Mr. JONES said he rather differed from Mr. Hutchinson on the last point. He thought that what was possible on the small scale was possible on the large scale. The frost that had been registered in his (Mr. Jones's) district—38° and 39°—was abnormal. He had lived in the neighbourhood 22 years, and had never before recorded so many degrees of frost, except for a short period; but this time it had extended over some weeks.

Mr. T. DUXBURY (Darwen) did not think they had any greenhouses in his district heated in the manner described by Mr. Chester. There was no doubt it was a step in the right direction; and if apparatus of a reasonably cheap character could be devised, he thought this method of heating greenhouses would be very successful. He did not know whether Mr. Chester simply applied gas to the ordinary apparatus, with the exception of a new boiler. But if so, they might perhaps induce some of their customers to use gas in place of solid fuel. So far as heating generally was concerned, gas was not looked upon, when used for continuous heating, as cheaper than solid fuel; but he was pleased to find, from what Mr. Chester had said, that it was quite as cheap for the heating of greenhouses. He inquired if Mr. Chester could furnish the members with a tabulated statement, showing the comparative cost of the two systems of heating for the same house for any length of time, together with the outside and inside temperatures.

Mr. C. ELLIOTT (Leyland) thought Mr. Chester was wise in drawing attention to the fact that the system of heating by gas was useful in *small* greenhouses. In large greenhouses such as those he (the speaker) had in his neighbourhood, a considerable quantity of coke was used; and therefore, he asked, would it be advisable for gas managers to recommend the use of gas for other than small greenhouses? Would Mr. Chester recommend that the large ones should be supplied with gas, rather than coke, for which they were such good customers?

Mr. R. HUNTER (Chester) agreed with Mr. Chester that such a system as described in the paper, applied to small greenhouses, would be very useful. In places where they had immense greenhouses, vineries, and so on, they could afford to keep a man to attend to the fires, and to maintain a uniform temperature; but in a small house, there could be nothing better than a properly designed gas arrangement. He had no doubt that Mr. Chester had gone so deeply into this subject that he would be prepared to devise something that would be effective in similar cases.

The CHAIRMAN expressed the hope that Mr. Chester would go further into this matter, and that, with his capability for the preparations of statistics, he would produce a table which would show them how much gas to use, the kind of apparatus and the number of pipes to be fixed, and all other particulars for heating small greenhouses. He was quite sure that for large greenhouses there was not much advantage in gas over coke; but in houses of small dimensions, where there were no attendants, it would be a boon. He was convinced there was here an immense field for the development of gas heating.

Mr. CHESTER, in replying upon the discussion, said that the dimensions of the house and particulars of the heating apparatus he had described were mentioned as clearly as possible in his paper, so that they might be a guide as to what was necessary to be done in regard to this matter, and as a means of reference. He stated in his paper the exact dimensions in connection with the apparatus he put down; but he also pointed out, in the concluding portion, that the dimensions of the apparatus were obviously too small in proportion to the amount of work that it was necessary should be done in this particular greenhouse. The whole thing was an experiment for the purpose of determining, from actual experience, the size of the apparatus most suitable for attacking the work that was required under the severest conditions. He thought the figures given in his paper would enable gas engineers to arrive at some definite conclusion as to what was likely to be required in a greenhouse where they might have occasion to apply this system of heating. On the question of the applicability and convenience of gas for this purpose, he was glad to find there was perfect unanimity. Mr. Veevers had referred to the reliability of gas compared with solid fuel; and on this point there could be no doubt. There might arise at times some difficulty from frozen service-pipes, through these being placed too shallow in the ground; and the facts which they had heard from Mr. Hutchinson, as to the depths that the frost had penetrated during the recent severe weather, would a valuable guide in laying services. It was not possible for gas to compete in heat with solid fuel like coke where the latter was required to be used on an extensive scale, because gas was very much more expensive per unit of heat developed. But where the comparison was very nearly equalized was in the amount of labour which it was necessary to expend upon solid fuel, in order to maintain it as a heat-producing agent, in contrast with the slight amount of labour required for producing heat by gas. He did not for a moment think it would be possible to apply gas in place of coke to the heating of horticultural houses requiring a temperature of 60° to 90°. But he was perfectly certain that, for moderate-sized greenhouses, where the object was merely to keep out the frost during the winter months, gas could be applied with as great an economical advantage as any solid fuel, inasmuch as the labour in connection with it was nearly *nil*, and its dependability was almost absolute. He believed there was a wide field for its application to this purpose; and he thought the members would do well to cultivate its introduction.

MR. W. E. PRICE'S CARBURETTOR.

A successful practical application of liquid hydrocarbon to the carburetting of coal gas has been devised by Mr. W. E. Price, of Hampton Wick, and is actually in constant use at the gas-works there, where we saw it working a few days ago, and can testify to the compactness, cheapness, and efficiency of the arrangement. The principle upon which Mr. Price has worked in designing his carburetting apparatus has been to expose as large an area as possible of the surface of the carburetting fluid to the current of gas intended to take up the vapour; and he has managed to observe this condition of success while securing a high degree of simplicity and economy of mechanical details. The arrangement is patented; but the specification is not yet published, and therefore we are precluded from stating explicitly the nature of the Price carburettor. We can at least remark, however, that it appears to answer its purpose—which is that of maintaining the illuminating power of the gas made at the Hampton Wick works at about 16 candles—perfectly; and we are assured that it has done so for several months past, notwithstanding the bad weather that has been experienced in this portion of Middlesex as in other parts of the country. With the water-main frozen hard in the ground in the road outside the works at a depth of 2 feet from the surface, no condensation of hydrocarbon has occurred in any one of the several syphons that intervene between the position of the carburettor and the gasholder inlet; and the apparatus (which was made without experience to determine its dimensions) has proved itself capable of doing four or five times the duty required of it. Occupying a ground space of not more than 4 feet by 3 feet, and standing the height of a table from the floor of the shed in which it is housed, this apparatus, which has no moving parts, carburets to the extent already stated a daily production of about 500,000 cubic feet of gas made from Newcastle or Durham coal. Steam heat corresponding to a pressure of not more than 2 lbs. per square inch is sufficient to perform the operation of vaporizing the fluid, which is ·700 petroleum spirit. The apparatus occupies the position of a bye-pass on the main; a sufficient flow of gas to take up the vapour being induced by the action of a very small steam-jet in the outlet-pipe. The spirit is fed to the carburettor through a sight-flow connection, controlled by a micrometer cock. There is an overflow syphon which never shows any unvaporized spirit, at the normal rate of working; and it has not done so when evaporating spirit at the rate of 10 gallons per hour, or sufficient to enrich 100,000 cubic feet of gas 1 candle per hour. This shows that there is plenty of margin for safety and comfort in the arrangement.

With regard to the working results, we have seen a report by Mr. H. Leicester Greville which states that, upon the mean of six series of tests taken on the raw gas and a corresponding number on the carburetted gas, each series embracing at least ten observations, raw gas of 16·01-candle power was enriched to 17·09 candles, or a mean increase of 1·08 candles, for a consumption of 1·05 gallons of ·700 gravity petroleum spirit per 10,000 cubic feet of gas. At the end of the day's working, the syphons on the mains were pumped, but no trace of condensed hydrocarbon was detected. The cost of the spirit on the works is 6d. per gallon; so that on this basis the cost of enrichment works out to 0·58d. per candle per 1000 cubic feet, which compares favourably with similar enrichment processes. This and the cheapness of the apparatus should attract the attention of gas managers.

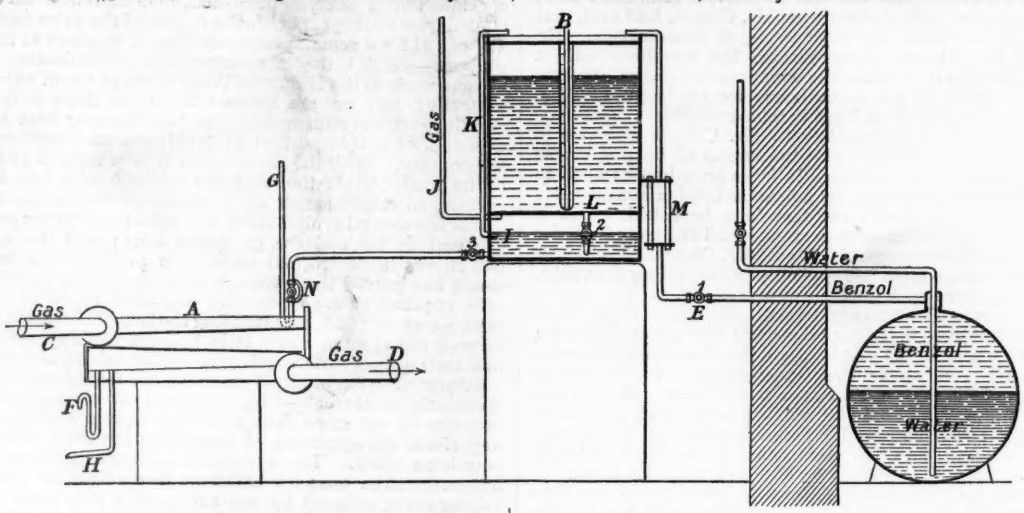
The Production of Electricity by Means of Water Power.—A scheme is on foot for utilizing the water power of the Falls of Foyers, on Loch Ness, in the production of electricity for working an aluminium manufactory to be started in the neighbourhood. The falls are well-known objects of interest to tourists in Scotland; and some alarm has been felt lest the beauty of the surrounding scenery should be marred. An assurance has, we believe, been given by the projectors of the scheme that this will not be; nor will the flow of water be affected, except in very dry seasons.

CARBURETTING BY BENZOL.

The Carburetting Plant at the Munich Gas-Works.

In the JOURNAL for Oct. 16 last (p. 735), we published an abstract of a paper, dealing with the above subject, presented by Dr. Schilling to the German Association of Gas and Water Engineers. It may be remembered that he gave the results of a practical application of Dr. Bunte's suggestions at the Munich Gas-Works, some particulars in regard to which had already been communicated by Herr Ries. Details of the apparatus were not then available; but these we are now in a position to supply. In view of the general interest attaching to the question of carburetting, and of the present price of benzol, it might be worth while to employ this material for enriching gas; thereby enhancing its value to the tar distiller, and raising the price of tar, to the benefit of proprietors of gas undertakings.

The carburetting plant at Munich was made by the Berlin-Anhaltische Maschinenbau-Actien-Gesellschaft, and delivered in a condition ready to be connected with the main at the gas-works. It will be seen from the accompanying illustration to consist of a carburetting apparatus A, and a storage-tank B; together with an indicator composed of a regulator and the necessary connecting-pipes. The carburetting apparatus consists of a rectangular box of special form, with movable lids, into which ribbed plates, placed at a slight incline, are inserted. Over these, the benzol flows in a thin sheet. The gas enters at C; passing in an opposite direction to the flow of the benzol, so that the most intimate contact takes place between it and the gas. The enriched gas leaves the apparatus at D, to be immediately mixed with the uncarburetted gas. The benzol, enters by E. At F is a test-cock, to ascertain if any unabsorbed benzol is left in the apparatus. A steam-heating apparatus is so arranged as to produce the temperature necessary for



evaporation (which is especially needed during the winter time), and also to replace the heat absorbed by evaporation. The steam, which enters at G and leaves at H, increases the capacity of the apparatus very considerably by its heat; so that a very small apparatus will have a very large carburetting capacity. The storage-tank serves to hold the benzol necessary to supply the apparatus. Its capacity in the plant illustrated is 500 kilos. (1102 lbs., or 155 gallons) of benzol, or about enough for a day's supply. The flow of benzol into the carburetting apparatus is always under uniform pressure; so that the supply, being once regulated at the outset of the operation, continues the same during the whole process. To secure this result—that is, to keep the benzol always at the same level I—special mechanism is provided. The storage-ank is a completely closed vessel, constructed with a double bottom. Benzol is forced out by gas, which enters through the pipe J, into the spaces between the bottoms; thereby avoiding danger from fire, since the benzol circulates in enclosed spaces, and is never brought into contact with the air—thus avoiding entirely the generation of explosive mixtures. By opening the cock No. 3, benzol flows from the lower vessels to the carburetting apparatus; but before the level can drop, gas enters the storage-tank by the connecting-pipe K, causing so much of the benzol to flow through the pipe L as is necessary to again seal the pipe J, by the raising of the benzol to the level I. The flow of benzol from the storage-tank is, therefore, always under uniform pressure.

To fill the tank, providing the benzol is brought to the works in barrels, the process is as follows: The cock No. 2 is closed, and a double pipe is screwed into the bung-hole of the barrel, connecting it with the ordinary water pressure through one pipe, and with the benzol supply E through the other. Then, by opening the water-cock, the water pressure drives the benzol from the barrel through the open cock No. 1 into the tank, causing the gas to flow back into the main through the pipes K and J. A large closed water-tube is inserted at M, so that the division between the water and the benzol can be seen directly the latter is all forced out of the barrel. As soon as the water appears at M, the cock No. 1 is closed. If the benzol is to be supplied to the apparatus from large masonry cisterns, it will be necessary to pump it into the tank. The indicator shows on one side the capacity of the tank in litres or barrels; and on the other, the capacity by weight for benzol of a specific gravity of ·85 to ·88. The actual amount may be ascertained at any time.

The supply of benzol, as well as the working of the entire apparatus, is regulated by the cock N, to which is attached a graduated circular scale, so that the proper quantity can be supplied for any rate of production of gas per hour. The divisions on the scale indicate the amount of benzol in kilos. per hour that will flow into the carburettor; and it is only necessary to find out how much is needed to carburet the gas produced per hour, and to set the cock to the point shown on the scale for this quantity of benzol.

The apparatus may be connected to any of the main-pipes at a point where the gas would be entirely free from tar. This can be best accomplished by a bye-pass, by which a sufficient amount of gas may be passed through the apparatus to absorb the benzol supplied; the rest of the gas being allowed to pass under the partially closed bye-pass valve. Whether or not the quantity of gas which is enriched is sufficient to enrich the entire amount of gas, can be ascertained at the outflow F; the test being that no benzol escapes. The apparatus is operated only at low pressure; and particular attention must be given that the over-saturated gas, on leaving the apparatus, is forced back by the shortest route to the main supply, in order to avoid any separation of the benzol from the gas. The erection of a carburetting apparatus parallel with the pressure regulators, which would enrich the gas during certain hours of the day, is not recommended, since by this method the enriching of the gas would be subject to the fluctuations taking place in the consumption—compelling the use of unnecessarily large and unproportioned quantities of benzol during the night, the result of which would be to cause difficulty in the regulation of the supply of benzol.

The apparatus is made in four different sizes; capable of evaporating 2500, 4000, 5500, and 8000 kilos. per hour, working at a temperature not below 64° Fahr. But its capacity may be increased during the winter by steam heating; when the evaporative power would be 8000, 12,000, 16,000, and 24,000 kilos. of benzol per hour. So that an apparatus enriching during the summer about 10,000 cubic feet of gas per hour, would in winter, with the aid of steam heat, enrich about 35,000 cubic feet per hour, or more than three times as much.

The Commercial Production of Acetylene.—A Company has lately been formed in Berlin, with a capital of £50,000, for the production of acetylene on a commercial scale. The title is the Gesellschaft zur Verwerthung von Acetylen-gas; and we learn that Messrs. Siemens and Halske possess a substantial interest in the new enterprise.

The Proposed Light and Heat Exhibition at Woodhouse Park.—Reference has already been made in our columns to the exhibition which it is proposed to hold at Woodhouse Park in the ensuing season. The long severe frost having now come to an end, considerable activity is being shown on the site selected; and we learn that a large number of men are at work on the main building. It is proposed to divide the exhibition into three sections—Gas, Electricity, and Oil. As it is desirable that all classes of illuminants and heating apparatus should be placed, as far as possible, on terms of equality, we are asked to mention that intending exhibitors will facilitate arrangements by making application for space to the General Manager (Mr. John Furley), Woodhouse Park, Shepherd's Bush, W., without delay.

GAS TESTING IN THE UNITED STATES.

Effect of Variations of Temperature in Photometer-Rooms.

An interesting report is to hand from Mr. Charles D. Jenkins, the Inspector of Gas-Meters and Illuminating Gas for the Commonwealth of Massachusetts, detailing the procedure of his department for the year 1894. The results of his testings of gas-meters are, of course, of little more than local interest; but the other work undertaken by the office which Mr. Jenkins superintends presents features of more general concern.

The law as affecting the State of Massachusetts provides that the gas of every company supplying illuminating gas to more than 50 consumers shall be tested at least twice a year; and that an additional inspection shall be made for every 6 million feet of gas supplied, but the inspections must not be made oftener than once a week. No notice is given to the companies of intended inspections, which are made at irregular intervals, so that no preparation can be made, if the companies were so inclined. The majority of inspections is made during the winter months; so as to follow the consumption to an extent. The minimum candle power allowed is 16; the standard English candles, corrected to a rate of burning of 120 grains per hour, being used, and the gas burned at the rate of 5 feet per hour. The coal gases and mixed coal and water gases are tested with a standard Sugg's "London" Argand burner; size "D" generally being used. The higher candle-power water gases are tested with the Sugg's "table-top" open burner, 6 feet size. The pure petroleum gases are burned through small lava-tip open burners, of from $\frac{3}{4}$ foot to 2 feet per hour capacity; the results being calculated to an hourly rate of 5 feet. For the petroleum gases mixed with air, both Argand and lava-tip burners are used, depending on the amount of air in the mixture. Total sulphur 20 grains, and 10 grains of ammonia per 100 cubic feet of gas are the maxima allowed of these impurities. No sulphuretted hydrogen is allowed.

With the larger companies, the inspection of whose works took place from each week down to as few as seven times during the year, the average illuminating power returned was 20·47 candles; the average amount of impurities being 9·51 grains of sulphur, and 1·91 grains of ammonia per 100 cubic feet. The smaller companies, whose works were inspected only two to five times during the year, furnished returns of 18·49 candles and 9·45 and 3·02 grains respectively. Ten companies making gas from petroleum are separately classed in the report; and the average quality of their gas is given as 31·48 candles. There were only three cases returned of deficient candle power; the lowest figure mentioned being 15·6 candles. Five excesses of sulphur were reported, and twelve of ammonia; the highest figures in any case being 23·5 and 31·3 grains respectively. Sulphuretted hydrogen was discovered on nine different occasions.

The following eudiometric analyses were made during the year. The first two are water gas; the third, mixed water and coal gas; the next four, coal gas. Waltham introduced a new process in September; and the eighth sample is some of the new gas (the nitrogen has however, it is remarked, since been reduced by adding coal gas):—

Place.	Candle Power.	Illuminants.	Marsh Gas.	Hydrogen.	Carbonic Oxide.	Nitrogen.	Oxygen.	Carbonic Acid.
Boston	24·9	16·59	19·78	32·07	26·10	2·42	..	3·04
Brookline	26·4	15·92	26·09	26·73	26·15	2·04	..	3·07
Lynn	19·4	9·39	28·74	42·56	15·74	1·48	..	2·09
North Adams	18·7	5·87	39·14	46·73	6·99	1·27	..	..
Taunton	17·4	4·82	35·86	52·00	5·80	1·44	..	0·08
Newton	17·2	5·14	34·55	48·96	7·26	3·14	..	1·00
Newton	17·3	5·18	35·47	48·73	6·25	3·00	0·13	1·24
Waltham	21·7	19·17	34·52	10·70	0·82	34·22	0·15	0·42

The question of temperature in the photometer rooms having arisen during the year, some experiments were made to determine whether temperature is an important factor, and, if so, to what extent. The method was to burn the gas under the same conditions, as nearly as possible, as in photometrical tests, with an air supply the temperature of which could be easily changed. To the perforated bottom of a large lantern was attached an air chamber, supplied with thermometers and a window for observations. The gas-burner in the lantern was put as near the bottom as possible, so that the temperature of the air did not change from the thermometers to the immediate vicinity of the burner. This was shown to be the case by experiment. Air was supplied to this chamber through a large pipe, one section of which was provided with tubes which could be heated by gas in order to raise the temperature of the incoming air. Suitable baffle-plates ensured uniformity of temperature by thoroughly mixing the air, and also prevented an unsteady supply to the burner. The lantern was lined with black velvet, to prevent reflection. The candle power was taken with a portable photometer, using the Edgerton standard, frequently standardized against candles. Care was exercised to keep the room at 60° Fahr. during the series of tests. The first table gives the results obtained with water gas burned through the open testing burner, Sugg's "table top;" the second table, the results using an Argand with coal gas. The results in each case are the average of a number of determinations:—

Open Burner.

Temperature (Deg. F.).	Observed Candle Power.	Corrected Candle Power.	Increase or Decrease.	Percentage Increase or Decrease.
30	8·46	19·27	2·92 dec.	13·2
35	8·82	20·09	2·10	9·5
41	9·02	20·56	1·63	7·3
50	9·46	21·55	0·64	2·9
56	9·70	22·10	0·09	0·4
60–66	9·74	22·19	..	..
72	9·91	22·57	0·38 inc.	1·7
81	10·10	23·01	0·82	3·7
89	10·26	23·36	1·17	5·3
100	10·84	24·69	2·50	11·3

"London" Argand Burner.

35	8·84	16·26	0·17 dec.	1·0
41	8·85	16·28	0·15	0·9
47	8·87	16·32	0·09	0·5
56	8·92	16·41	0·02	0·1
61–65	8·93	16·43	..	..
70	8·94	16·45	0·02 inc.	0·1
81	8·97	16·50	0·07	0·4
87	9·12	16·78	0·35	2·1
95	9·52	17·51	1·08	6·6
100	9·76	17·95	1·52	9·3

These results show that, with an open burner and high candle power gas, the temperature has a decided effect, due to the gas having an unlimited air supply, the temperature of which can easily influence the burning gas by lowering or raising the flame temperature. But with an Argand burner, the construction of the burner in limiting the supply of air, and heating it somewhat before combustion, would tend to counteract the effect of cold air, as was found. The heated air, by adding to the flame temperature, increased the candle power noticeably. It was found desirable to keep the photometer rooms between 60° and 70° Fahr., as colder rooms detract from the candle power, while warmer ones increase it.

Effect of Temperature in Refining Petroleum.—According to R. Zaloziecki, when petroleum is treated with sulphuric acid, the lower the temperature at which the acid acts, the better is the quality of the refined petroleum. This had been proved by a series of tests ranging from 0° to 25° C.; the product at 0° being colourless, and at 15° distinctly yellow. It was also found that, by working in the cold, the yield of the treated product was increased. The sulphuric acid dissolves impurities and oxidizes the heavy parts of the mineral oil. While the former reaction is little affected by low temperatures, the latter is favoured by higher; sulphurous acid being then extensively separated. At the same time, the petroleum becomes more charged with resinous acids and oxidized products.

"Chemical Technology."—We have already noticed the first volume of the above-named work, which is being published by Messrs. J. and A. Churchill. The second volume, edited by Mr. C. E. Groves, F.R.S., and Mr. W. Thorp, is devoted to lighting by candles and oils, and is illustrated by about 350 figures. The section on the petroleum industry is by Mr. Boverton Redwood, who also writes the one on lamps, and, in conjunction with Mr. D. A. Louis, the section on miners' safety lamps. The third volume, which is now in a forward state, will contain sections on gas and electric lighting—the former subject having been entrusted to Mr. Charles Hunt, of Birmingham; the latter to Professor Garnett, of the Technical Board of the London County Council, and nephew of the late Mr G. Garnett, of Ryde.

Mason College Chemical Society.—This Society (of which Professor Percy F. Frankland is President) had their first annual excursion last Thursday. The programme for the day (of which a copy has been sent to us by the Hon. Secretary, Mr. P. C. Holmes Hunt) was an eminently suitable one for inaugurating the outings of a society of this character. The members commenced the day's proceedings as early as 10.45, by driving from the college to the Nechells Chemical Works, where, by permission of Mr. E. A. Brotherton, they inspected the processes of manufacturing sulphuric acid, sulphate of ammonia, &c. These works, it may be mentioned, were erected about eighteen years ago, for the purpose of making sulphate from the ammoniacal liquor produced at the Birmingham Gas-Works. The party afterwards journeyed to Leicester, and visited, by permission of the Corporation Gas Committee and their Engineer (Mr. Alfred Colson), the Aylestone Road gas, residual products, and electric lighting works. About two hours were usefully spent in examining the plant, and receiving explanations as to the various operations involved in the production of the two lighting agents, and the working up of the residual products of gas manufacture. Before leaving the works, the visitors took tea in the reading and recreation room, on the kind invitation of Mr. Colson.

REGISTER OF PATENTS.

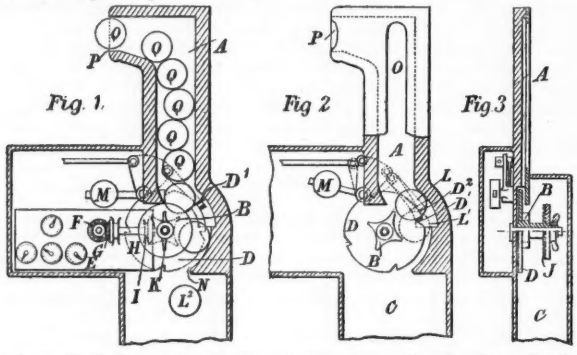
Production of Combustible Gas.—Farinetti, A., of Blackfriars Road London, and Brentini, P., of Earlsfield. No. 3018; Feb. 12, 1894

This apparatus for the production of combustible gas consists (1) of an electric motor; (2) of a fan or air-pump driven by the motor; (3) of a vaporizing chamber, through which atmospheric air is forced; (4) of a gasholder, to receive the mixed air and vapour from the chamber; and (5) of devices whereby the motor is started or stopped automatically, and the air admitted or cut off according to the consumption of gas, or according to the position of some moving part of the gasholder. When the electric motor is in operation, it actuates the fan or air-pump, and thereby forces air into the vaporizing chamber. The air, in its passage through the chamber, becomes impregnated with the vapour of the hydrocarbon contained therein; and the combined air and vapour then passes to the gasholder, and thence a pipe leads to any point of consumption in the usual way.

The gasholder is connected, by a lever, to a tap or valve in the pipe connecting the air-pump to the vaporizing chamber, so that, as the holder is filled with gas, it closes the valve, and thereby prevents further delivery of air to the vaporizer; while, as the holder is emptied, it opens the tap, and allows the air to be delivered to the vaporizer. When the holder is full, it opens the electric circuit, so that the motor stops until the consumption of gas permits the holder to re-establish the electric circuit, and the motor is again driven. In this way, the apparatus works automatically, and makes gas in proportion as it is consumed.

Prepayment Gas-Meters.—Stevens, J. H., of Kew, Surrey. No. 3649; Feb. 20, 1894.

The claim for this invention is: The combination of a coin-receiving chamber or locker; a knock-out mechanism, adapted to be revolved by the meter mechanism so as to remove coins from the locker in proportion to the operation of the meter; a receiving till for the knocked-out coins; and a detent for the knock-out or meter mechanism, adapted to be displaced and held from operative engagement during passage of coins through or by the knock-out.



A method of carrying the invention into practice is shown in the engraving, where the coins, while under the action of the movable part of the mechanism which carries them one by one to the cash till or drawer from the locker, operate on the detent by which such movable part is brought to rest when the coins are exhausted, so that the detent is held inoperative while there is a coin in contact therewith. Fig. 1 is a vertical section through the mechanism, showing coins therein. Fig. 2 is a part vertical section, part elevation, of the same device, with some parts omitted, and other parts in a different position. Fig. 3 is a vertical cross section partly in elevation.

A is the locker or chamber into which the consumer places one or more coins. B is the knock-out mechanism. C is the till into which the coins are delivered by the knock-out. D D^1 is the detaining mechanism. E is the usual counter of the meter (which latter, with its counter, may be of any construction). With one of the wheels of the counter E is geared a toothed wheel, on the same shaft as the bevelled wheel F. It gears with the bevelled wheel G on the shaft H, carrying a toothed wheel I gearing with a crown-wheel J, on the shaft which carries the knock-out B. The crown-wheel J is removable from its shaft, so that it may be replaced by another, with more or fewer teeth, according to variations in the price of the gas supplied. The crown-wheel, keyed to the shaft, is held thereon by the nut K. The knock-out B has a number of equidistant radiating arms (a convenient number being four); and the disc D has an equal number of equidistant recesses, into any of which the detent D^1 may fall, and thus arrest the rotary movement of the disc D, and consequently of the knock-out, the counter, and the meter itself. It is preferable also that the detent D^1 should control a valve or equivalent device, by which the gas supply is cut off when the mechanism is stopped; and this may be effected by connecting the detent to the valve or its equivalent—for instance, through rods and a bell-crank permitting a drawing forward of the detent in the direction of the movement of the disc D, so as to close the valve, or perform an equivalent function, whereby the further movement of the detent in the same direction is arrested and the parts are brought to rest.

The shapes of the detent D^1 and of the notch are such that the detent tends to preserve its position in the notch until it is thrown out therefrom by a propulsive force. Such force is provided by the weight and fall of the coin, which, in the mechanism illustrated, touches the detent D^1 and the arm of the knock-out B in the position shown at L in full lines in fig. 2. The coin will then push aside the detent—swinging it outward about its pivotal centre on the bell-crank; and the coin will be arrested at the position shown in dotted lines at L^1 (fig. 2), where it is held between the next arm and the side of the casing. The detent D^1, having been released from the notch, will, under the influence of the counterweight M, have returned to the position shown in dotted lines at D^2, the supply will be re-continued, and the meter train freed.

If there are other coins in the locker, they will rest upon each other, edge upon edge; and the lowermost one will rest upon the edge of the coin at L^1. But upon the commencement of the action of the meter and revolution of the knock-out B, the arm in fig. 2 will slip forward under the edge of the coin next above that at L^1. The coin is also partially restrained by the detent, the outward movement of which is limited by the case, so that this coin will be restrained until the arm has passed under it, as at fig. 1; and it can, during the ensuing part of the revolution of the knock-out B, fall into the next following recess therein, and then be carried forward with the knock-out. In this position, however, its outer edge passes beyond the edge of the disc D, or in such a way that its presence prevents the detent D^1 from entering the slot or recess next following that from which it has been released. This process is repeated so long as there are any coins in the chamber A to fall into the recesses in the knock-out B. Consequently the detent D^1 is not suffered to fall into a recess until the number of coins are exhausted.

Each coin, as it passes to the orifice N, falls into the till C, as shown at L^2. O is a window in the cover or wall of the chamber A, whereby the coins therein may be seen; P is the coin-entrance to the chamber; and Q represents coins therein.

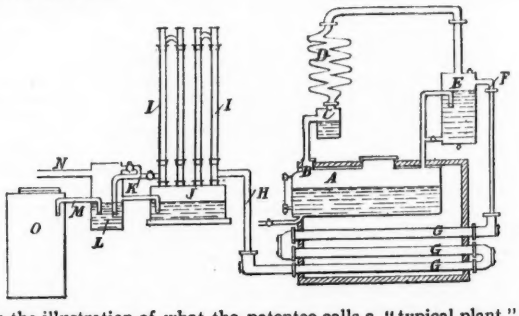
Manufacture of Gas fom Oils, Tars, &c.—Laing, J., of Edinburgh. No. 4053; Feb. 26, 1894.

This is a modification of the arrangement described in patent No. 35 of 1893.

The patentee proposes to interpose a tank vessel between the return pipe from the condenser and the superheater, for the purpose of trapping any excess of condensable vapours which might pass over from the condenser into the superheater, and thus have a tendency to cool it too much. The inlet to this tank is on the top of it. A little lower down, a pipe is connected to another opening which leads to the superheater; and a little below this again is another opening, having a pipe connecting the tank with the still direct, so as to act as an overflow when the tank is being charged. It may be fitted with a sealed syphon-pipe, or with a valve which is kept open during the charging of the tank, and shut during gas making, to allow any excess of oil charged into the tank to pass direct to the still, instead of flowing over into the superheater. As the still is fed from the tank, a pipe connection, with a cock or valve on it, is made near the bottom connecting the tank with the still. This pipe may have a syphon bend on it, which, when full of oil, will act as a seal against the vapours from the still. A cock is fitted on to the bottom of the tank, by which any water gathering there can be drawn off, and thus prevented entering the still.

After the gases have left the superheater, they pass through a length of pipe placed at a higher level, and having a fall to the superheater, so that any vapours which may here condense out will be returned to the superheater direct, and be there again decomposed. The temperature of the superheater is regulated by the amount of gas desired to be made, and the speed at which it is to be produced. A dull red heat—about 1000° Fahr.—is a good oil-gas making temperature. The resulting gas, on its way to the holders, is passed through a cooler having a chest or vessel to catch any oil which may condense out; and this is conveyed through an overflow-pipe into the stock tank for the oil employed for making into gas. By this means, only permanent gas is passed to the holders, and all condensable products are trapped, and again returned to the still.

The oil vapours may be passed into coal retorts in use, and there be decomposed, and thus permit of the oil gas made being at once mixed with coal gas, and so conveyed to the holders in the usual way; or the vapours may be passed through a separate superheater for themselves, as described; or the two methods may be used conjointly. The apparatus may be employed in conjunction with a coal-gas plant, and the surplus heat from the coal retorts may be utilized to assist in decomposing the oil for gas making, or it may be fitted up independently of a coal-gas plant.



In the illustration of what the patentee calls a "typical plant," the oil-still A has an outlet B for the vapours generated. These pass through the water-trap C and ziz-zag condenser D to the feed tank E. Hence they flow, by the pipe F, to the superheaters G fitted in a furnace. After passing through these heated pipes, the vapours are led by the pipe H to the gas coolers I fixed over the chest J. The seal-pipe K leads from the coolers to a seal-tank overflow L, from which one pipe M leads to the residue store tank O, while another pipe N is the outlet to the meter and holders. Arrangements are made by which direct communication is obtained between the apparatus and the holders; also for the overflow from E to be returned to the oil-still A.

Double-Acting Compression Gas-Engines.—Singer, P. E., of Kensington Court, London. No. 4960; March 9, 1894.

The object of this invention is to produce a double-acting compression gas-engine without a piston-rod passing through the centre of one of the combustion chambers.

In order to attain this, the patentee leaves a slot on either side of the cylinder, through which projections from the piston pass and these

slots are long enough to allow the piston to move backwards and forwards in full stroke. To the projections of the piston are attached the rods connecting it to its crank. The slots in the cylinder are closed as regards the combustion chambers by sleeves or shells fixed on either side of the piston, and forming part of it. The sleeves move with the piston, but never uncover the slots in the cylinder. The cylinder covers extend inwards a given distance, so as only to leave the proper space for the compressed charges, the stroke, and the thickness of the piston; and the projections of the covers approximately fit the piston sleeves, and have packing-rings on them. By this means an annular space is left between the cylinder and the cylinder cover for the piston sleeves to bury themselves in.

When compression is not desired in the combustion chamber, the extremities of the piston sleeves are thickened; and the annular spaces are used as pump-barrels (the necessary valves being added), and the piston sleeves as plungers to compress the charge.

Gas and Oil Vapour Engines.—Skene, R., of Wickham Street, Lambeth. No. 7023; April 9, 1894.

This invention relates: Firstly, to means for ejecting the residual products of combustion from the working cylinder of a gas or oil engine, and for separating such products from the fresh charge; also to improved appliances for regulating the compression of the charge of gas or vapour and air, and the expansion of the exploded gases. Secondly, to an improved vaporizing chamber for the oil in an oil-engine, in which chamber a portion of the charge of air is heated, and mixed with the vapour before entering the cylinder. Thirdly, to an improved oil-pump, and a valve for spraying the oil as it enters the vaporizing chamber. Fourthly, to improved friction driving and reversing mechanism for locomotives, yachts, &c., when driving by gas or oil-vapour engines.

Incandescent Gas-Lamps for Railway Carriage Lighting.—Imray, O.: communicated from J. Pintsch, of Berlin. No. 7638; April 17, 1894.

The patentee points out that incandescent lamps of the usual construction could not readily be employed for railway carriages and other localities having limited head-room, as the considerable height required by the burners would cause the glass globe to project down too far. The present invention is designed to obviate this inconvenience by dispensing with the air and gas mixing chamber, ordinarily situated immediately below the burner, and arranging the chamber at the side of the burner, so as to form part of the gas-supply pipe, the continuation of which is made to enter the side of the base of the burner.

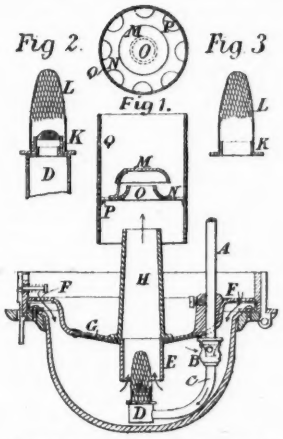


Fig. 1 is a vertical section of the lamp and a plan of the shield and cap. Figs. 2 and 3 are modified forms of the mantles.

The gas-supply pipe A, at its entrance into the lamp below the reflector G, is formed with a nozzle, to which is attached a small surrounding chamber B, having lateral holes for the entrance of air, like the mixing chamber of a Bunsen burner; and from the lower end of this chamber, the mixed gas and air is led, by a pipe C, into the side of the base of the burner D. This base may either be an entirely closed chamber, with a perforated or wire-gauze top, through which the gas and air issue into the surrounding incandescence mantle; or the base may have a central vertical passage through it, for the admission of a further quantity of air to the burner orifice, which is in this case of annular form.

According to another improvement, the mantle, instead of being suspended from a wire support, has its lower open end either merely fitted tightly upon or fixed in any suitable manner upon a flanged ring K (figs. 2 and 3)—that is, made to fit easily upon a cylindrical upper part of the burner D, as at fig. 2. By this means, the mantle is rendered more easily removable and replaced by a new one when defective.

Surrounding the mantle, there is provided a short glass cylinder E (fig. 1), suspended from the reflector G of the lamp, and serving to direct the air supply—entering in the usual manner through holes F in the top of the lamp—down to the lower end of the mantle. The glass cylinder may, however, be dispensed with, as the draught of the ordinary metal chimney Q above the reflector will generally be sufficient to insure the proper action of the burner.

To provide means for preventing particles of ashes, &c., from falling through the chimney on to the mantle, there is fixed, in the outer chimney of the lamp, a transverse metal shield N, having a central hole O for the draught; and at a certain distance above this hole is a bell-shaped cap M, overlapping an upward projecting rim round the hole, so that any particles falling down the chimney are arrested by the cap and shield. Holes P are also formed round the periphery of the disc N for the escape of the gases.

Supply or Delivery of Fluids in Exchange for Coins.—Staples, W., of Clapham Junction, S.W. No. 18,749; Oct. 6, 1893.

This invention is chiefly designed to increase the efficiency of apparatus such as that described in patent No. 10,381 of 1888 and No. 14,372 of 1892. It relates more particularly to the means for adjusting the apparatus, so that the quantity of gas delivered through the meter in exchange for each coin can be readily varied by an authorized person, when any change takes place in the price of gas. Another feature is the provision of means whereby the quantity of gas which will be delivered in exchange for each coin inserted can be ascertained or checked by the inspector without the necessity of putting the meter mechanism in action.

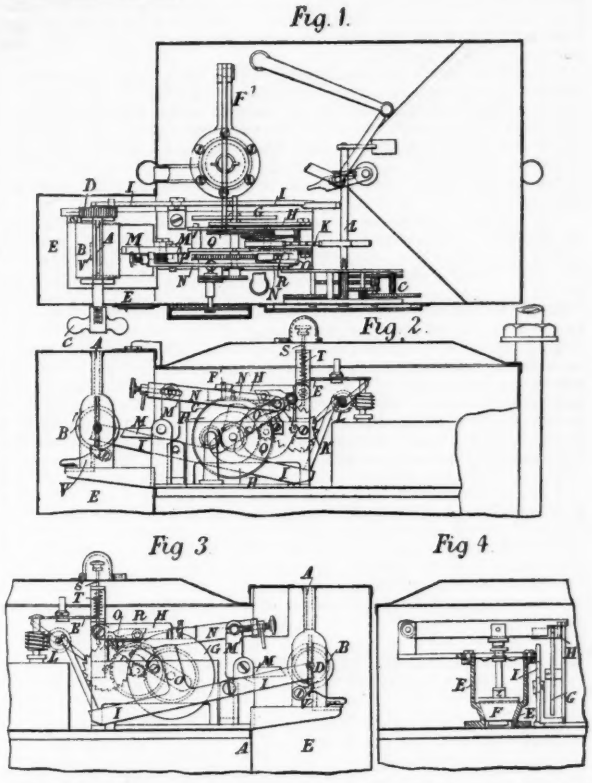


Fig. 1 is a plan, partly in horizontal section, showing one form of this meter. Figs. 2 and 3 are vertical sections of fig. 1. Fig. 4 is a cross section.

The meter-case is provided with a supplementary casing for the special mechanism, which is arranged partly in the upper portion of the said meter-case, and partly in supplementary casing at the side. A is the coin-slot; and B is a rotary slotted cylinder or cylindrical coin-pocket arranged beneath the coin-slot. It is mounted on a shaft, and arranged to be rotated by means of a handle C outside the casing. To prevent the withdrawal of a coin after it has been dropped into the coin-pocket, and the latter has been turned through such an angle as to move the coin from beneath the coin-slot, there is fixed on the shaft a ratchet-wheel D, and combined therewith are pawls held in engagement with the wheel by a divided spring. One pawl is longer than the other, so that the distance between the ends of the two pawls is approximately equal to half the pitch of the ratchet-wheel. The coin-pocket must, therefore, always be rotated in the same direction—that is to say, it can only be turned in the required direction to operate or adjust the quantity mechanism through the medium of the coin. After the coin has dropped into a receptacle provided in the casing, the cylinder must be further rotated in the same direction, instead of being turned back. By the use of the two pawls arranged as described, the turning back of the coin-pocket through any appreciable distance is prevented, and at the same time the necessity for employing ratchet-teeth of very fine pitch is obviated. F is a drop-valve for controlling the flow of gas through the meter. It is arranged in a gas-tight casing or cylinder, closed at its upper end by a flexible diaphragm, secured to the upper end of the cylinder by a ring. The spindle of the valve is connected to a lever, the movement of which is controlled by a notched disc or quantity-wheel G. The lever extends across and rests upon another lever H, pivoted to the frame of the quantity mechanism, and provided with a pin or projection adapted to rest either on the periphery or in a notch of the disc G.

I is a stop-lever, such as is described in the former patent, for arresting the motion of the meter mechanism, by the movement of a rod into the path of the revolving arm E of the meter mechanism. The lever is provided with an arm which extends upward nearly to the underside of a pin on the pivoted lever H; so that, when the operating handle C is turned, and the lever I is actuated by a pin in the ratchet-wheel D, the arm will open the valve F, and release the notched disc G.

K is a ratchet-wheel, arranged to be rotated, step by step, by suitable tappets formed on or attached to the worm-wheel shaft L of the meter mechanism, as described in the former patent, for the purpose of turning the quantity-wheel G back to its original position. M M^1 indicate a bell-crank lever, pivoted to the frame in such a manner that the arm M will be acted upon by the coin during a portion of its movement with the coin-pocket B. The other arm M^1 is provided with a pin working in a slot in a link or bar N, connected with a feed-lever O pivoted on an arbor, on which is also mounted a friction-wheel or disc P, provided

with a roughened or milled edge. The arbor also carries a spur-wheel Q connected with a suitable train of wheel-work, which, like that described in the former patent, comprises a suitable friction-clutch and terminates in the ratchet-wheel K. The lever O is provided with a pivoted arm or pawl R, having an end-piece or palm of wood or other material adapted to engage with the milled periphery of the friction-wheel P. The pawl R and the lever O are arranged to rest upon pins or studs in the frame of the meter, in such a position as to be out of engagement with the friction-wheel P, except when acted upon by the bell-crank lever M M^1.

For varying the quantity of gas supplied per coin all that is necessary is to increase or decrease the amount of lost motion in the joint between the bell-crank lever and the link N connecting it with the feed-lever O. For this purpose in the end of the link a set-screw is provided with a lock-nut, so that the screw may be readily adjusted, and then be locked in position.

In order to check the adjustment of the apparatus, and ascertain whether it is correct to supply the desired quantity of gas per coin, without the necessity of putting the meter in action for this purpose, there is a sliding spring rod or bar S, carrying a pawl, and arranged to be repeatedly operated by hand against the pressure of a spring T, in such a manner as to reproduce the action of the tappet of the meter mechanism on the terminal ratchet-wheel K of the quantity mechanism.

The operation of the meter is as follows: To adjust the quantity mechanism, a coin is inserted in the coin-slot A, and falls into the pocket B, or upon the periphery of the coin-pocket, in which case the latter is turned by means of the handle C until its slot is brought beneath the coin-slot, thus permitting the coin to fall into the pocket. The coin-pocket is then turned in the direction indicated by the arrows. In the first part of the rotary movement, a pin acts upon the lever I, and turns it about its pivot; thus raising a rod into the path of the arm E, so as to prevent the movement of the meter mechanism, and, at the same time, lift the levers H and F^1, so as to disengage the pin from the notch of the disc G. In the further rotation of the handle and coin-pocket, the coin acts upon the lever M M^1, and, through it and the link N, imparts an angular movement to the feed-lever O. In this angular movement of the lever, the pawl R is pressed against, and thus caused to engage with, the milled edge of the wheel P; and this wheel and the disc G are turned through a small angle—this motion being permitted by the friction-clutch described in the former patent. The coin drops from the pocket, when inverted, into a receptacle provided in the casing; a stop V being provided for preventing the complete revolution of the coin-pocket until the coin has dropped out. The coin-pocket must be turned through a complete revolution, and another coin be dropped therein, before any further adjustment of the quantity mechanism can be made.

Manufacture of Illuminating Water Gas.—Hastings, J. L., of Philadelphia, and Hauk, C. D., of Chicago, U.S.A. No. 24,624; Dec. 18, 1894.

The object of this invention is to provide for the generation of a large body of water gas, and the proper carburizing of it, and the fixing of the resultant gas and vapour, as well as the reduction of any carbonic acid formed, and to provide for maintaining the heat for fixing the hydrocarbons, so that a longer continuous run in the manufacture of the gas may be carried on, and during the run a heat may be maintained proper for carburizing and fixing, but not so high as to break up the hydrocarbons. In this way, it is claimed that a smaller proportional quantity of hydrocarbons is required to form an illuminating gas of high candle power, and the gas formed is of more even quality.

Fig 1

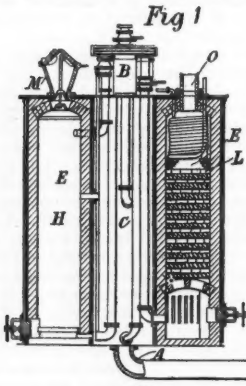
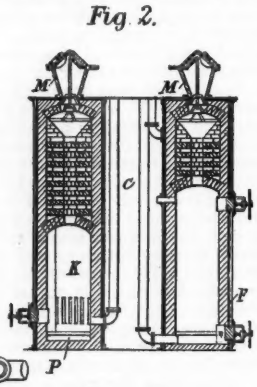


Fig 2.



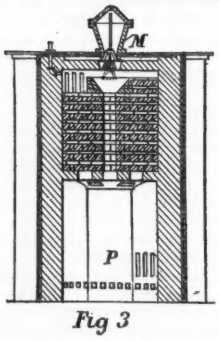


Fig 3

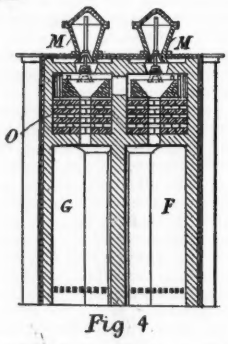


Fig 4

The illustration shows four vertical sections of various portions of the plant.

The apparatus is enclosed primarily by outer and inner casings; the two casings forming together the annular body portion of the apparatus. The inner casing is closed at the bottom, except for an air supply-pipe A, leading from a compressor. It is closed at the upper end; the box B forming an extension from the top plate, and the enlarged head of the box forming a circular extension from the box of practically the same diameter as the main body of the tank C, which is formed by the inner casing. The circular body portion is divided into a series of chambers by vertical arches E, which extend from side to side, so as to form the end walls of the chambers; the crowns of the arches of the two adjoining chambers either bearing on each other or being close to each other, so as to form proper braces for the pressure from the generators within the chambers. The body portion is divided into several chambers, which may be designated as follows: The cupola generator F, the cupola generator G, the cupola generator H, the fixer K, and the steam superheater L. By the location of the several walls, the sizes of these chambers can be varied; it being desirable to provide a large fixing surface within the fixer K, and it not being necessary to have the cupola generators of as great section or capacity. The construction of the cupola generators F G is shown to the right of fig. 2 and in fig. 4; the chambers having the coal space in the lower part, and the superheating chambers above. The two chambers are separated by an arch with a central port, through which the fuel may be introduced into the coal chamber; a passage being formed through the checker-work of the upper chamber, to permit of the coal passing directly into the lower chamber. The coal-feeder M opens through the roof; and below is a feeding-shoot built of solid brickwork, resting upon the checker-work of the upper chamber. This brick funnel does not extend entirely over the surface of the checker-work; but the checker-work extends to the upper part of the chamber around the sides of the funnel. In this way, the gases generated in the lower chamber, either in blowing up or in making water gas, will pass into the body of checker-work in the upper chamber or superheater. The cupola generator G has the coal chamber N and superheater O filled with checker-work, and is of exactly the same construction as the cupola generator F. The cupola generator H (which is next to the fixing chamber K) is of the same form as the generators F G; but it has no superheater. It is simply a long coal chamber, having the coal-feeder at the upper end; and so constructed because the gases formed therein do not require to be superheated in their course to the fixing chamber. The fixer K is made of greater superficial area than the several cupola generators, and is constructed as shown in figs. 2 and 3, having substantially the same width as the several generators, and arranged concentric with the air reservoir C. It is, however, of greater length—that is, occupying a greater portion of the space around the air reservoir. This is desirable, as it is well both to introduce the oil or other hydrocarbons into it and fix the gases generated in the several chambers. It is provided with the coke chamber P in the lower part thereof, and the fixing chamber K^2 in the upper part thereof; the said fixing chamber, composed of checker-work supported on a perforated arch, extending across above the coke chamber, and having the ports therein. The passages for the gas are arranged in the upper parts of the chambers by means of the ports between the cupola generators F and G at the upper ends of the superheaters; also by ports between the cupola generators F and H, in the upper parts of such cupola generators, in about the same line as the ports leading from the cupola generator H into the upper part of the fixing chamber K. The gases are carried from the base of the coke chamber P into the steam superheater L, through a series of ports (which extend through the division-wall between the chambers K L) opening into the base of the chamber L, and rising through a perforated arch therein. Above this arch is supported a mass of checker-work; and above the checker-work in the upper part of the superheater is a coil for carrying superheated steam into the several chambers. The exit-pipe from the upper end of the superheater L has at the upper end a valve, through which the heated products of combustion can escape into the atmosphere; while below is the gas-eduction pipe, through which the gas escapes, passing into the scrubber, feed-water heater, or other suitable chamber.

In working this plant, the coal is fed to the several cupola generators, which are gradually heated either by the ordinary air current by opening the doors at the base, and the opening of the coal feeders or outlets at the tops of the several chambers, or by air through the pipes, as found desirable. This is continued until a body of heated coal is formed in each cupola generator; and it is desired to heat up the rest of the apparatus. In this case, the doors are closed, and the blast continued at a proper pressure; the air being fed to the different chambers at suitable points, so that the generator gas formed in the coal chambers is ignited and burned within the checker-work of the superheaters of the cupola generators F G, and passes through the ports over the cupola generator H. The gas formed in this chamber is also burned by the admission of air at the upper end; and coal is fed to the several coal chambers, until the proper bodies of ignited and heated fuel are formed. Meanwhile, the gases so generated pass over into the fixer K, and are burned within the checker-work in the upper part, passing down into the coke chamber P in the lower part, which has been previously filled with coke through the coal-feeder M above; the heated products, passing down through the body of coke, raising it to the proper heat for gas making.

Only the heated products of complete combustion are carried down through the body of coke employed; and there is no combustion (or practically none) in this mass. The action of the heated products of complete combustion is to heat the coke by direct contact therewith, and by passing through the pores thereof; it being found that by heating in this way, by direct contact with these heated products, without permitting the combustion, the coke is raised to the necessary heat without any waste of it. For this reason also, the mass of coke in the fixing chamber lasts much longer than if it were heated by its own combustion—an important point in the economical manufacture of the gas. The heated products then pass over, and portions are consumed by an air-blast and rise through the checker-work, and circulate around the steam superheating coil, and finally escape through the outlet-pipe. This is continued until the whole apparatus is brought to the proper condition for gas making. Steam is then admitted to the cupola generator H; and, passing up through the body of incandescent

fuel therein, it unites therewith to form water gas. This gas, without superheating, passes over into the fixer K; and the oil or other hydrocarbon is introduced into the upper part thereof above the checker-work. The oil is here vaporized (being introduced, if desired, by a steam-jet), and uniting with the water gas formed in the generator H and passing thence into the coke chamber P, fixed within the body of heated coke therein. The making of the gas is completed in this chamber; and flowing thence into the steam superheater L, it passes into the eduction-pipe, and finally into the scrubber or feed-water heater, and thence to the tank.

This is continued for a considerable time. A large body of gas can be formed in the cupola generator H, because of the deep body of coal which it is adapted to hold. At the proper time, steam is admitted to the coal chamber, and combines with the incandescent coal to form water gas; and this rises into the gas superheater, and is superheated therein, and then passes through the upper end of the cupola generator H, into the fixing chamber K. The gas is thus superheated before the oil is introduced; and the superheated gas acts largely to fix the gases by its own heat. At the proper time, steam is also admitted to the coal chamber N and the cupola generator G; and the gases formed are superheated in the superheater O, and flow through the upper parts of the cupola generators F H into the fixing chamber K. By the superheating of the gases made in the latter part of the run, the heat of the apparatus for fixing purposes is maintained through the heat of the gases themselves; and consequently the gases can, it is said, be made for a much longer period than where such gases are not superheated, and a much more even and regular body of gas obtained. During all this operation, the gases flow through the steam superheater, and the heat necessary to properly superheat the steam is maintained by the re-heating of the gases in the mass of checker-work which had been previously heated as above described, so that the proper heat for sustaining a body of highly superheated steam is always maintained.

APPLICATIONS FOR LETTERS PATENT.

3806.—COLLIS, A. B., "Oil, gas, or vapour engines." Feb. 22.
3847.—JACKSON, J. B., "Gas-stove." Feb. 22.
3855.—LANE, H., "Construction and method of operation of gas or oil engines." Feb. 22.
3916.—SMITH, T. A., "Temporarily repairing burst water-pipes." Feb. 23.
3923.—WALLMANN, H. F., "Petroleum and gas motors." Feb. 23.
3962.—GREEN, J. J., and OATES, W., "Gas-retorts." Feb. 25.
4060.—WALKER, A., BUSCOMB, W. J., and WALKER, J. M., "Automatic gas economizer." Feb. 26.
4116.—BINNS, J. P. and H. G., "Gas and oil engines." Feb. 26.
4129.—MOELLER, J., "Supports for incandescent gas mantles." Feb. 26.
4142.—WILLIAMS, J. S., "Unions, couplings, or joints for pipes, conduits, and the like." Feb. 26.
4280.—WOOD, J. S., "Grillers or gas cooking-stoves." Feb. 28.
4282.—GREEN, J. J., and OATES, W., "Retorts for the manufacture of gas and for other purposes." Feb. 28.
4302.—OUSEY, T., "Gas and other taps or valves." Feb. 28.
4324.—TERRELL, T., "Mantles for incandescent gas-lights, and supports therefor." Feb. 28.
4328.—GREVILLE, P. D. W., "Distribution of artificial light." Feb. 28.
4437.—BAKER, A., "Rendering water gas odoriferous." March 1.
4494.—DENAYROUZE, L., "Incandescence gas-lamps." March 2.
4500.—GEDYE, W. F., TOWNSEND, E. J., HOWELL, G. S., and GREEN, H. W., trading as the Economic Supply Association, "Gas-burners." March 2.
4505.—CUTLER, S., "Fittings for water-gas carburettors." March 2.
4521.—BRAZIER, F. J., "Cocks or valves for water-mains or other water-pipes." March 2.

The Redemption of Bolton Corporation Gas Annuities.—The scheme of the Bolton Corporation for the redemption of their gas annuities, to which reference was made in the JOURNAL on the 19th ult. (p. 390), has so far been very successful, according to a report submitted by the Borough Treasurer (Mr. G. Swainson) at the last meeting of the Finance Committee. The report shows that the yearly amount paid for gas annuities is £14,460; and deducting those already redeemed by the Corporation for extinction, the net amount payable is £14,040 11s. 6d. This at thirty years' purchase gives £421,217 5s. The result of the conversion up to the present time is as follows: 155 annuitants, receiving £7340 10s., accept £22,025 1s. 3d. in stock at 30 years' purchase; 2, receiving £12 6s. 3d. accept £389 16s. 3d. in cash; 10, receiving £533 13s. 4½d., have declined to accept stock; and 96, receiving £6154 1s. 10d., have not replied. It will be seen that, out of 263 annuitants receiving an annual sum of £14,040 11s. 6d., 155 have accepted the Corporation proposals; being more than half of the whole. The Committee have recommended the Council to order the creation and issue of the amounts of stock required for the conversion of the annuities.

The Salary of the Salford Corporation Gas Engineer.—Speaking in support of a recommendation of the Gas Committee, at last Wednesday's meeting of the Salford Town Council, that the salary of the Gas Engineer (Mr. S. Y. Shoubridge) should be increased from £660 to £750 per annum, Mr. Holland stated that Mr. Shoubridge was appointed to his present position seven years ago at a salary of £500, to be increased from time to time if the works were conducted in an intelligent and prosperous manner. The output of gas had increased by 40 per cent.; and the profits had risen from £56,000 in 1887 to £84,000 in 1894. These facts spoke strongly in favour of the good management of Mr. Shoubridge. The workmen had not been neglected, having been advanced, in time and money, from 10 to 50 per cent.; and the Sunday work had been much reduced. Gas had been diminished in price; and if the same rate had been maintained as when Mr. Shoubridge first undertook the duties, they would have been making a net profit of £1000 a week. There were only two other corporation gas-works comparable with Salford; and they paid their Managers £1250 and £1500 respectively. The motion was carried; and various other advances, amounting to about £300, were agreed to.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The South Metropolitan "Workman-Director" Proposal.

SIR,—I am much obliged to Colonel Makins for his letter on "Workmen-Directors;" because free and full discussion of the subject is most desirable in order to establish the principle if it be sound, or should it be as he says a "false step" (which, by the way, is the term commonly applied to every step in advance), to prove it to be a mistake and unworkable.

The Colonel says: "Proper discipline would be out of the question;" and he tells me it will "take a good long stare" before this "lion in the path" will be put "out of countenance." But I really cannot see the lion. I have read and re-read the paragraph wherein the idea of the workman-director under the orders of the foreman is ridiculed—the common lot of most innovations in their initial stage. But the Colonel's illustrations have not convinced me; because they entirely miss the kernel of the question, which is, *respect for authority*. The foreman derives his authority ultimately from the Board; and the workman-director—a man who will have been not less than seven years in the Company's service, and has saved and invested in its stock not less than £100—will not be so totally wanting in the right feeling and good sense of Englishmen as, when engaged in his ordinary duties, to fail in that respect for the authority and obedience to the orders of the foreman, that are characteristic of all good and sensible workmen. There is no necessity to call in the aid of "fancy" to imagine men, even in high positions, rendering obedience to subordinates, when the conditions require it. The Home Secretary and other persons in authority over the police, stop or move on at the bidding of the ordinary policeman; and I daresay the Colonel himself has often obeyed the private when in authority as a sentry. If therefore this is the main objection, I regard it as merely a phantom of the imagination.

The Colonel's letter, and the remark made by him at the last meeting at Horseferry Road—that if they contemplated the adoption of profit-sharing it would be "necessary" for them "to consider a re-adjustment of their labour rates," which means that a reduction of wages should accompany profit-sharing—proves that he has not yet learnt, I will not say the A B C, but even the A of this question. He is, therefore, hardly competent to deal with it in its present stage. Six years ago I might have expressed myself quite as strongly and as confidently as he has done now. In fact, when drafting the profit-sharing rules in 1890, I introduced the following words: "Nothing in these rules contained, or which may be contained in any rules hereafter agreed upon, shall give any *employé* whether officer or workman any right to interfere in the management or control of the Company's works or in the working and carrying on of the Company's business." And now, as the result of five years' experience and study of the question of bringing capital and labour into accord, the thing I am most anxious to do at present is to obtain the authority of Parliament to make provision at the proper time for representatives of profit-sharing employee shareholders to sit on the Board.

Colonel Makins says: "Either the proposed Director is to represent only those workmen who are shareholders as a section of the proprietary body, in which case his presence on the Board would have no special significance, as the interests of all the proprietors may be assumed to be identical, or he must sit as a representative of labour *per se*, and in that case he would be entirely out of place, even if his presence were not actually mischievous." I quite agree with him as to the last-named alternative. A man in this position on the Board would cause division and strife, not concord. He would intensify, rather than obliterate, the line that separates class from class; and, instead of promoting identity of interest, he would act entirely in the opposite direction. If, therefore, the objections of the Colonel are based on this assumption, as they seem to be, they have no foundation, and fall to the ground. The workman-director is to be selected by an important—I think I may say ultimately the most important section of the proprietors, not merely to represent their interests, but to do his best to promote the general prosperity of the Company. This, let me say, is of more importance to his constituents, whose livelihood and general welfare depend upon that prosperity, and who from their position as workers (and in this I include every shareholding employee, whether officer or workman) can do more than all the rest of the shareholders put together for the good of the Company.

I will now trace the steps by which the movement has advanced to its present position. It is really an outcome and an extension of the sliding-scale which, while identifying the interests of the shareholders and the consumers, left an equally important body out in the cold. The great labour upheaval of 1889 showed the absolute necessity of doing something to attach the workmen to the Company; and in November of that year the Board *unanimously* adopted profit-sharing in the shape of a bonus percentage on wages for every 1d. reduction in the price of gas below 2s. 8d. per 1000 cubic feet. This was accepted by all the non-unionists, and brought them over to the Company's side when the struggle came in the following month. Accompanying the adoption of profit-sharing was the offer to allow 4 per cent. interest on any portion of the annual bonus, or other savings deposited with the Company. The next step was to induce the workmen to invest their savings in the Company's stock. Up to the end of 1893, they did this to the extent of over £4000. In 1894, the offer was made to them that the bonus percentage on wages would be increased conditionally on one-half of such bonus being invested in the stock. Nearly all the officers and workmen accepted; and at the end of the year some £18,000 was so invested. As this investment must increase at the rate at least of £6000 a year, and possibly and probably (if due encouragement be given) at a much greater rate, the time is not far distant when the employees of the Company will hold a large amount of its stock. So far there was perfect unanimity, not only of the Directors, but every shareholder who has expressed an opinion has warmly approved. In short, everyone inside or outside the Company agrees it is most desirable for the employees to be shareholders.

This being so, what is the next obvious and necessary step? Surely that these officers and workmen—some 2000 in number already—who have shown their confidence in the Company, should, when their holding increases to (say) £50,000, be trusted to elect one or more representatives to sit on the Board, not merely that they may see how the property of the shareholders is managed, but that their knowledge and experience may be used to improve and strengthen the management. This seems to me the logical and necessary outcome of the profit-sharing system; and, if so, the difficulties, real or imaginary, must be met and overcome. At present, the Company are bound by Acts of Parliament. Neither the present Board nor their successors can do anything; and that being so, I thought they might well include in the application to Parliament this year, the power necessary to unbind them or their successors, and thus enable them when the time comes (as it shortly will) to be free to act in the manner most conducive to the interest of the Company.

Up to this point, there has been perfect unanimity; but here, though I by no means stand alone on the Board, a majority (as stated at the meeting) is against me. But I do not despair. The encouragement given at the meeting, and in other influential quarters, has been most gratifying. So far, all told, only about half a dozen shareholders have expressed themselves adversely; while spontaneous support was given by a greater number, including the mover and seconder of the resolution in favour of the proposal.

The Colonel is mistaken in saying I invited the shareholders to endorse the proposal. I said the Directors "would like an expression of opinion;" but I withdrew the resolution at the request of the opponents, who objected to its being put, on the ground that no notice had been given. I mention this, because in the discussion on the Bill on Friday last in the House of Commons, it was assumed that the shareholders were adverse to the proposal. This can only with certainty be said to be true of the small number who expressed an adverse opinion. I yet hope we shall all be able to agree, and be again as united in the future on an enlarged basis as ever we were in the past.

Reigate, March 2, 1895. GEORGE LIVESEY.

The Relative Cost of Gas and Electric Lighting Works.

SIR,—Referring to the article on this subject in yesterday's JOURNAL, I may point out that the figures given in the "Gas Manager's Handbook" as to the average cost of gas-works per million cubic feet of annual output—viz., from £600 to £700—includes the total capital, both share and loan, required for such works, not only the structural portion and the distributing plant, but the cost of the land, law, parliamentary and other expenditure, and an amount required as floating capital. This estimate is given in the last edition of the "Handbook," published in 1889. The figure is being gradually reduced as the output increases, and by reason of the prevailing comparatively low prices of materials and plant.

As proving the accuracy of my 1889 estimate, the newly issued Parliamentary Return relating to all authorized gas undertakings in the United Kingdom other than those of local authorities, gives an average capital of £620 per million. This was for 1893 (the latest year given in the returns); and the figure to-day would be something less.

The structural cost—including the distributing plant, depends to some extent, of course, on the size of the works. But if we take a comparatively small works, capable of producing (say) 120 million cubic feet per annum, the cost of the structure at present prices will be about £490 per million, apportioned as follows:—

Manufacture and storage plant	£315
Distributing plant	175
Total	£490

The cost of very large works will be less than this.

The writer in the *Electrician* has exhibited a marked disingenuousness in treating the subject. If he had turned to page 428 of the "Handbook" (fifth edition), he would have seen the estimated capital outlay on gas-works set out in full detail. The *Electrician* will have to revise its recent comparison of the cost of gas and electric light works if we are to place any reliance on its statements.

5, *Norfolk Street, Manchester, March 6, 1895.* THOS. NEWBIGGING.

Mr. L. T. Wright's Paper at the Society of Chemical Industry.

SIR,—I am pleased to answer the question that Mr. Hunt has put to me at the end of his last letter, as, though the matter involved was in no way treated in my paper, yet it cropped up in the discussion, and I was glad to have the opportunity of combating a view not rarely held—namely, that a good lighting gas is not a good heating gas, and that better lighting gases are not at the same time better heating gases.

My answer was this: It was a mistake to suppose that a gas, to be a good heating gas, must be of low illuminating grade; for, by increasing the carbon and hydrogen density, an increase in the lighting power was obtained, and at the same time an increase in heating power—that is to say, an increase in heating power corresponding to the increased carbon and hydrogen density (hydrocarbons). What generally takes place with illuminating gases is this: With increased illuminating power, there is found in the gas an increased quantity of carbon combined with hydrogen (hydrocarbons), and a lesser quantity of free hydrogen; and since every hydrocarbon is, volume for volume, superior in calorific value to free hydrogen, the replacement of free hydrogen or other bodies not hydrocarbons—such as carbonic oxide, &c.—will be, from the heating point of view, an advantage, as it is also from a lighting point of view. The extent to which the increased quantity of hydrocarbons will be advantageous depends upon their nature; for there are some that yield more, and some that yield less, heat on combustion than the carbon and hydrogen composing them would yield if in the free state and not combined.

For instance, such members of the paraffin series as have been calorimetrically examined, yield less than their component elements if in the free state. Other hydrocarbons—such as ethylene and propylene, which are members of the olefine series of hydrocarbons—yield more heat. Acetylene also yields on combustion more heat than its elements would afford if burned in the free state. Benzol gives approximately the same amount of heat as its constituents would do if consumed in the free state.

For convenience, I will give a table of some of the principal hydrocarbons occurring in coal gas; the amount of heat in centigrade units afforded by one cubic metre (Column A); the heat calculated from their constituents (Column B); and the differences between these two quantities (Column C). I have followed the metric system, as almost all this thermo-chemical work has been carried out by chemists who employ this system. The heat value is also, in the case of those materials containing hydrogen, calculated on the basis of the water formed on combustion being brought to the liquid condition. I have mostly adopted Berthelot's numbers for the hydrocarbons; and I may mention that Thomsen's number for benzol would indicate that this body yields rather more heat than its constituents if free. The free carbon I have calculated to a cubic foot of carbon gas of density 1. This is a very convenient number; as, though free carbon is not known to exist as a gas, yet carbon enters into the composition of so many gases.

Body.	A. Calorific Value of One Cubic Metre of Gas.	B. Calorific Value Calculated from Components.	C. Differences.	
	Calories.	Calories.	Calories.	Per Cent.
Carbon (C) . .	4,332	..	..	..
Hydrogen (H_2) .	3,054	..	..	..
Methane (CH_4) .	9,542	10,440	− 898	8·6 less.
Ethane (C_2H_6) .	17,370	17,826	− 456	2·6 ,,
Propane (C_3H_8) .	24,740	25,212	− 472	1·9 ,,
Heptane (C_7H_{16}) .	50,825	54,756	−3931	7·2 ,,
Ethylene (C_2H_4) .	15,260	14,772	+ 488	3·2 more.
Propylene (C_3H_6) .	22,670	22,158	+ 512	2·3 ,,
Acetylene (C_2H_2) .	14,210	11,730	+2480	17·3 ,,
Benzol (C_6H_6) .	35,000	35,166	− 166	0·5 less.

Thus, without knowing the nature of the hydrocarbons (and it is not easy to know from gas analysis the precise proportions of the various hydrocarbons that enter into the composition of any sample of coal gas), it is only possible to calculate from the known carbon and hydrogen density of the unsaturated hydrocarbons occurring in coal gas—for instance, the *approximate* calorific value. But a glance at the table will show that the approximation will be within limits. Thus methane gives 8·6 per cent. less heat, and acetylene (which does not occur in large quantities) gives 17·3 per cent. more heat than we should calculate if we only had their carbon and hydrogen densities to depend on.

In entering into these details, I do not do so with any idea of supplying information to Mr. Hunt, who is quite as well informed about them as I am; for I cannot forget his inquiry into the values of different qualities of illuminating gas used in an "Otto" gas-engine (see Gas Institute "Transactions," 1882)—an inquiry that must convince us all that he has very specially studied this subject. There can be also little doubt that in the minds of those who were discussing this subject on the occasion of the reading of my recent paper, there was present a far greater range of gases than those supplied by the gas undertakings of this country. I refer to water gas, generator gas, and other fuel gases. I am, however, quite content to confine the matter in this letter to illuminating gases.

Taking at hap-hazard from my notes the analyses of two gases, one of 12·7 candles and the other of 28·3 candles, and calculating the calorific values per cubic metre, I obtain the results expressed in the following table:—

Gas of 12·7 Candles.—Carbon Density of $C_n H_m = 2·5$.

			E.			F.	
H_2 . .	0·584	×	2572	= 1502	×	3054	= 1783
CO . .	0·061	×	3055	= 186	×	3055	= 186
CH_4. .	0·317	×	8576	= 2719	×	9542	= 3025
C_nH_m .	0·022	×	17335	= 381	×	18540	= 408
N_2 . .	0·016			..			..
	1·000		..	4788	..		5402

Gas of 28·3 Candles.—Carbon Density of $C_n H_m = 2·85$.

H_2 . .	0·2492	×	2572	= 641	×	3054	= 761
CO . .	0·0595	×	3055	= 182	×	3055	= 182
CH_4 .	0·5639	×	8576	= 4836	×	9542	= 5381
C_nH_m .	0·0982	×	19771	= 1942	×	21135	= 2075
N_2 . .	0·0292			..			..
	1·0000		..	7601	..		8399

Note—The C_nH_m hydrocarbons are calculated from the values of ethylene and propylene.

The heat values have been calculated on two bases. One, E, is on the basis that the water formed on the combustion of the hydrogen remains gaseous. This is the ordinary condition; since, generally, in the applications of fuel, the heat in gaseous products of combustion has no utility below the temperature of boiling water. Thus the heat that is given out on the condensation of the gaseous water (steam) to liquid water is lost economically. The other basis, F, is that the water formed by burning the hydrogen is brought at the end of the operation to the liquid form. This is a condition very rarely realized in the industrial and domestic applications of hydrogenous fuels.

To make this matter clear, I will refer to the case of free hydrogen. This gas, if burned into water, will, if the steam produced be utilized for an operation below that at which the water vapour or steam becomes liquid—that is, below 212° Fahr.—afford 3054 calories per cubic metre. If, however, the operation the heat is to perform is to be carried on at a temperature over and above 212° Fahr.—as in cooking, in boiling water, &c.—then the cubic metre of hydrogen will only give 2572 calories, or nearly 16 per cent. less. For that reason, hydrogen as a fuel is not so useful for many applications as its value if calculated on the basis E would lead one to suppose.

From the two cases cited (and they are the results of single experiments, and not averages and taken at random), it will be interesting to trace the increase of candle power, carbon and hydrogen density, and

calculated calorific power on basis E. (The hydrogen density of the $C_n H_m$ or unsaturated hydrocarbons is taken as 5.)

One Cubic Metre contains— Total Carbon including CO. C.	Hydrogen. H_2.	Ratios. C.	H_2.	Candle Power.	Calorific Value.
0·433	1·273	1·00	1·00	1·00	1·00
0·903	1·622	2·09	1·27	2·23	1·58

One of the applications of otherwise illuminating gases is, when burned as a non-luminous flame, to give light by the incandescence of solids not entering into combustion, as in the Welsbach burner. I have not a very large number of observations to go upon; but the following will show what is not perhaps universally admitted—that gases of high illuminating power are more useful for the Welsbach burner than gases of lower grade:—

Candle Power of Gas as Ordinarily Expressed.	Candles Obtained in Welsbach Burner, Calculated to 5 Cubic Feet.	Ratios.
16·50	75	1 : 4·5
21·75	98	1 : 4·5
24·50	108	1 : 4·4

Mr. Hunt has shown, in the memoir I have before referred to, that the motive power (which is a function of the heating power) of a gas increases with the illuminating power. I extract the following figures from his table of results:—

Illuminating Power of Gas. Candles.	Value for Motive Power.	Value for Lighting.
11·96	1·000	1·000
26·00	1·864	2·173

Aguitton (*Comptes Rendus*, 117, 56-58) has studied the relation between the lighting and heating power of coal gas; and selecting from his table of results gases of somewhat similar lighting value to those I have cited, it will be found that, with candle power of 1 : 2, the heating power is 1 : 1·5. Thus we find the following ratios:—

Candle Power. Ratios.	Heating Power. Ratios.	
12·70 : 28·3 or 1 : 2·30	1 : 1·58	Calculated.
13·00 : 26·0 ,, 1 : 2·00	1 : 1·50	Aguitton.
	Motive Power.	
11·96 : 26·0 or 1 : 2·17	1 : 1·86	Hunt.
	Incandescent Burner.	
16·50 : 24·5 or 1 : 1·50	1 : 1·44	Wright.

The advantage obtained by increasing the carbon and hydrogen density—*i.e.*, the carbon in the form of hydrocarbons—in coal gas, is a double one; there being a corresponding increase both in the heating and lighting power.

1, *Victoria Street, S.W., March* 8, 1895. LEWIS T. WRIGHT.

The Registration of Station Meters and Consumers' Meters.

SIR,—At the Manchester Institution meeting last Saturday, I am reported to have said: "There was no doubt that the difference between consumers' meters and the station-meters might be taken generally at 27 per cent." The point raised was the difference between the temperature of gas at the station meter as against that of the consumers' meters; and I stated that my experience warranted the conclusion that the difference in temperature might be taken generally at 27 *degrees*—not *per cent.* I am sure that, before the "Transactions" of the Institution are issued, you will make the correction, and perhaps be good enough to allow me space for the above in your next issue.

Chesterfield, March 9, 1895. C. E. JONES.

Water-Works Extensions at Bridgwater.—A Local Government Board inquiry was held at Bridgwater last Thursday regarding a proposal of the Corporation to make certain extensions at their water-works at Ashford. For this purpose they have asked for permission to borrow £1500, the repayment of which is to extend over 40 years, with interest at 3 per cent. per annum. The main object of the new works is to save a large amount of water which is now wasted.

Gas-Works Extensions at Spalding.—At the meeting of the Spalding District Council on Monday last week, a scheme was adopted for considerably extending and improving the public lighting of the town. It was also decided to erect another gasholder and carry out other improvements at the works, at an estimated cost of £3000. The Council have now £2100 in hand on the gas-works account. A short time ago the cost of gas was reduced to 2s. 6d. per 1000 cubic feet.

The Plymouth Corporation and the Gas Company.—The question of the alleged nuisance from the works of the Plymouth Gas Company is not yet satisfactorily disposed of. The Sanitary Committee at their last meeting appointed a deputation to again wait on the Directors of the Company, and urge them to take immediate steps to abate the nuisance. In the meantime the Town Clerk was instructed not to go on with proceedings which have been threatened against the Company for causing a nuisance.

Suggested Purchase of the Stretford Gas-Works by Local Authorities.—A preliminary report with regard to the gas supply of the district was laid by the Clerk before the members of the Stretford District Council last Tuesday. The document had reference to the powers, duties, and liabilities of the Manchester Corporation and of the Stretford Gas Company, and had been prepared with a view to the discussion of the question of the desirability of one or more of the local authorities in the area of supply acquiring the gas-mains in the district and the undertaking of the Stretford Gas Company. The following resolution was adopted: "That the several local authorities within the area of supply of the Stretford Gas Company be asked if they are willing to entertain the question of the acquisition of the undertaking; and, if so, whether they would be prepared to pay a *pro ratâ* share (calculated upon rateable value) of the cost of obtaining a valuation and report by Mr. Thomas Newbigging, C.E., with the view to the joint purchase of the said undertaking."

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bill withdrawn: Hebden Bridge Local Board Gas Bill.

Opposition withdrawn: Bristol Water Bill.

Bill read a second time: Rotherham Corporation Bill.

Bills referred to a Select Committee, consisting of Viscount Hampden (Chairman), Lord Teynham, Lord Sinclair, Lord Seaton, and Lord Shute, to meet on Tuesday, March 12: Ambleside Local Board Gas and Water Bill, Edinburgh and District Water Bill, Felixstowe and Walton Water Bill, Hebden Bridge and Mytholmroyd Gas Board Bill, Ilfracombe Gas Bill, Merthyr Tydfil Local Board Water Bill.

HOUSE OF COMMONS.

Monday, March 4.

THE LONDON COUNTY COUNCIL AND THE WATER SUPPLY.

The House resumed the consideration of the following motion (see *ante*, p. 491), proposed by Mr. Stuart: "That any county council and any of the London Water Companies be entitled to be heard before the Select Committee on the above [Lambeth] Bill on any petitions praying to be heard by Counsel, presented by them on or before March 14 next, and that such petitions be referred to the said Committee."

Mr. STUART stated that, as the result of an arrangement, he proposed to add to his motion: "That the district council or other local authority of any district within the area of any of the London Water Companies who have, within the time limited by the Standing Orders, presented petitions against any of the Bills for acquiring the undertakings of the said Companies, shall be entitled to be heard by Counsel upon such petitions against the Bills to which they relate, and have leave also to present petitions praying to be heard by Counsel at any time not later than the 14th day of March against the Lambeth Water (Transfer) Bill; and that any such petitions be referred to the said Committee, and that the petitioners be entitled to be heard by Counsel before the Select Committee if and so far as the Select Committee may think fit."

Mr. BYRNE, who had moved an amendment to the original motion extending its scope to district councils, said he understood the addition now proposed to mean that district councils and other local authorities were to be put on exactly the same footing as county councils. If that was so, he was quite prepared to withdraw his amendment.

Sir F. DIXON-HARTLAND desired to include the Thames Conservancy within the terms of the motion.

Mr. STUART said it was the intention of the promoters that the Thames Conservancy should be heard; and they were informed that at present the Conservancy had *locus standi*. If this was found not to be the case, he would be ready to make a motion at a later stage.

Mr. R. G. WEBSTER asked whether the hon. member was prepared to accept his suggestions to insert, after the words "county council," the words "district council or other local authority."

Mr. STUART said local authorities and district councils had *locus standi* with regard to Bills relating to their own district. But there were other local authorities who wished to have *locus standi* upon this Bill; and it was agreed that, if they felt it worth while to petition against the East London Bill, they should have it with regard to this one. He did not think all the aggrieved persons would be let in; but he pointed out that endeavours had been made from the first to deal fairly with those who wanted *locus standi* with regard to the Lambeth Bill. He was not, however, disposed to accept the amendment.

Mr. BARTLEY moved that the matter should be postponed until some definite instructions were obtained from the new County Council.

Mr. BOULNOIS thought the propositions made by his colleague on the Council were perfectly fair ones; and he trusted there would be no delay in settling this matter.

Mr. BARTLEY did not wish to press his amendment, but was anxious to know exactly where they were.

Mr. JACKSON suggested that, as there seemed to be some confusion, it would be better to postpone the question until the next day.

Sir F. DIXON-HARTLAND moved that the debate be adjourned until Thursday; and this was agreed to.

Thursday, March 7.

On the resumption of the debate to-day,

Mr. STUART asked leave to withdraw the motion standing in his name in regard to the Lambeth Water (Transfer) Bill, and to substitute the following amended motion, to which, he said, many of the parties interested had agreed: "That any of the London Water Companies presenting a petition against the Bill not later than March 14, praying to be heard by counsel, agents, and witnesses, and the council of any county which includes any part of the Metropolitan water area, presenting a petition against the Bill not later than March 21, praying to be heard by counsel, agents, and witnesses, shall be entitled to be heard on such petition before the Select Committee on the Bill; and that any district council or other local authority for any district wholly or in part within the Metropolitan water area, the London Water Companies jointly, and any other person claiming to be affected by the Bill, presenting a petition against the Bill not later than March 21, praying to be heard by counsel, agents, and witnesses, may be heard on such petition before the Select Committee on the Bill, if and so far as the Committee shall think fit."

The original motion was by leave withdrawn.

Mr. R. G. WEBSTER asked why the local authorities should not have the right to *locus standi* before the Committee as well as the county councils.

Sir J. LUBBOCK asked if the local authorities had agreed to the motion.

Mr. STUART said the motion was in accordance with the ordinary way in which the business of the House was conducted. He knew

that many more than half of the local authorities had, through their representatives, agreed to the matter.

The amended motion was then agreed to.

Mr. STUART next asked leave to withdraw the motion standing in his name in regard to the Southwark and Vauxhall Water (Transfer) Bill, and to substitute for it the terms of the preceding motion.

This was agreed to.

The following progress was made with Bills last week :—

Bills referred to a Select Committee, consisting of Sir J. Kitson (Chairman), Viscount Cranborne, Mr. Wroughton, and Mr. S. Howard Whitbread, to meet on Monday, March 11: Bridlington and Quay Water Bill, British Gaslight Company Bill, Brymbo Water Bill, Hayward's Heath Gas Bill, North Middlesex Gas Bill, Whitby Water Bill, York New Water Bill.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Tuesday, March 5.

(*Before Justices* LAWRANCE *and* KENNEDY.)

In re an Arbitration between the Yeadon Water Company and Wright.

To-day, the reserved judgment was delivered on this special case, which came before their Lordships on Jan. 18 (see *ante*, p. 226).

Mr. TINDAL ATKINSON, Q.C., and Mr. WILLES CHITTY appeared for the Water Company; Mr. GULLY, Q.C., and Mr. MANISTY represented Mr. Wright.

Justice KENNEDY said a question was raised upon the Arbitrator's award in the form of a special case; and the point was whether the Company were entitled, as had been found by the Arbitrator, to deduct a sum of £1745 from certain retention moneys, in their hands under a building contract, the benefit of which had been assigned to Mr. Wright by the original Contractor. The question arose in this way: On Dec. 31, 1889, the Company entered into a contract with John Briggs for the construction of a reservoir; one term of the contract being that, in case the work was unfinished on Sept. 30, 1891, or such other day to which the period for completion might be extended by the Engineer, the Company reserved the right to deduct from the retention-money, or any money due to the Contractor, the sum of £500, with a further sum of £5 per day for each and every day which might elapse between the day of completion and the time the works should actually be completed. Then followed a clause enabling the Company, in case the works should not be carried on satisfactorily, to terminate the contract for certain purposes, without thereby, in any other respect, affecting the liability of the Contractor; and in case the Contractor became bankrupt, insolvent, or compounded with his creditors, it should be lawful for the Company, by notice in writing, to terminate the contract so far as regarded the performance of the same under the direction and by means of the Contractor, but without thereby affecting in any other respect his liability. In November, 1892, the Contractor, owing to want of funds, became unable to complete the work; and the Company, after notice, availed themselves of the re-entry clause. Thereupon Mr. Samuel Wright, who was one of the two sureties for the due performance of the contract, took from the Contractor an assignment, dated Nov. 30, 1892, of all his rights and interest under the contract; and on Dec. 5 he entered into an agreement, under seal, with the Company to complete the works, upon the express condition that nothing therein contained should be construed to alter, vary, or rescind any of the conditions of the general contract; it being the intention of the parties that everything should stand precisely on the same footing, and be dealt with in the same way as if the new agreement had not been made, with the single exception that Wright was allowed to take up and complete the works. He went on with them, and completed them on Sept. 22, 1893; the time having been extended by the Engineer to Jan. 16, 1893. The Engineer, as Arbitrator under the contract, had found that the delay in completion beyond the extended date was due to delay, not on the part of Wright, but of Briggs, while he was carrying out the contract; and further that the Company had in hand as retention-money the sum of £3684 18s. 10d., of which £2280 had accrued due before Sept. 22, 1893. The contest now was as to the right of the Company to deduct from the £3684 the sum of £1745; being £500 liquidated damages, and £5 a day from Jan. 16 to Sept. 22, 1893. Counsel for Mr. Wright had contended, in effect, that the Company, having exercised their power of re-entry, and put an end to Briggs completing the work, had waived their right to recover liquidated damages; and, further, that Wright did not until Dec. 5, 1892, become liable to submit to any reduction from the retention-moneys. This view the Court was unable to adopt, having regard to the concluding words of the clause "without thereby affecting in any other respect the liability of the Contractor," which effectually kept alive the Company's right to insist on retaining the money. The delay beyond the extended time, according to the finding of the Arbitrator, could not be taken to have proceeded from any default on the part of the Company. Such default would, no doubt, have afforded an answer to the claim. The Company were entitled to make the deduction claimed; and judgment must be entered in their favour, with costs—these to include the costs of the Company of the earlier application, which resulted in the direction to the Arbitrator to make his award in the form of a special case.

On the application of Mr. Wright's Counsel, their Lordships granted stay of execution, provided notice of appeal was given within ten days.

CITY OF LONDON COURT.—Friday, March 8.

(*Before Mr. Commissioner* KERR.)

Thompson v. The East London Water-Works Company.

This was an action to recover from the defendants the sum of £1 11s. 3d., an alleged overcharge for water for a non-existing conservatory, at the rate of 5s. a year for 6¼ years. One defence was that a portion of the claim was barred by the Statute of Limitations.

Mr. R. S. CUSHING appeared for the plaintiff; Mr. G. KEBBELL represented the defendants.

Mr. CUSHING said that since December, 1887, the plaintiff had been paying the water-rate according to the applications and demands made upon him. In 1894, however, it came to his knowledge that the defendant Company were overcharging in respect of the water supplied. He thereupon made application to them for particulars of their demand; and in December last the Company supplied them, as follows: "Rateable value of house £39, £1 19s.; two water-closets, 8s.; one bath, 4s.—total, £2 11s. High service, 25 per cent. in addition, 12s. 6d.; conservatory, 5s. Total, £3 8s. 6d."

Mr. KEBBELL insisted that, by the Acts of Parliament, a dispute as to rateable value could only be settled by two Justices.

The COMMISSIONER: You are making confusion worse confounded. It is a perfect bit of mosaic work for its confusions.

Mr. KEBBELL: It really is, Sir, a bit of mosaic work; and I say you cannot entertain a question of the repayment of money paid by mistake. In consequence of the course which the plaintiff has thought proper to pursue, our relative positions have been altered. Had the plaintiff taken objection at the proper time, I should have been able to take him before the Magistrates; but I cannot do it now. Further than that, he has brought me here where no right of appeal lies, unless special permission is given.

The COMMISSIONER: That shows the utter absurdity of our legal system, as it seems to me. This man (the plaintiff) says he has paid you too much.

Mr. CUSHING: That much is admitted in the correspondence.

Mr. KEBBELL: Nothing of the kind.

Mr. CUSHING: In the correspondence, I shall show that the 5s. has been overcharged. The defendants made a mistake, and have corrected their demands.

Mr. KEBBELL: Read the letters.

Mr. CUSHING proceeded to read the correspondence. This commenced on April 17, 1894, when the plaintiff wrote to the defendants asking for particulars of their claim. Then, when plaintiff informed defendants that there was no conservatory, the Company sent an inspector to examine the premises and report. On Dec. 10, plaintiff wrote asking for the return of the overcharge for 6¼ years for the water for the conservatory, amounting to £1 11s. 3d. On the 11th of December, the Secretary of the Company wrote denying that there had been any overcharge, but saying that, as little water was used on that account, the charge for the future might be waived. When plaintiff paid the collector in December, 1894, he gave him clearly to understand that he should insist upon his right to be reimbursed the overcharge, on account of the water supplied to a non-existing conservatory. The plaintiff's demand was not objected to; but while the charge of 5s. was knocked off, one of 4s. for a urinal was substituted. This was also a mistake, because there was no such place.

Mr. KEBBELL: The charge of 4s. was never paid; and the mistake was put right as soon as it was pointed out.

The COMMISSIONER: That only shows how the Company is doing its business. (To Mr. Cushing): Have you paid the 4s.?

Mr. CUSHING: No.

The COMMISSIONER: Then don't trouble me with it. You are suing for 5s. a year for 6¼ years overpaid.

Mr. CUSHING: I want to show how the Secretary of the Company makes mistakes.

The COMMISSIONER: Secretaries always do; but they never own to it. You may as well attack the Lord Chancellor, and ask him to admit that he has made a mistake. He will never do so.

Mr. KEBBELL: There was a charge of 5s. for water supplied to a hose connected with a tub on the premises, now no longer used.

Mr. CUSHING: That is another mistake. There was a claim made for water supplied through a hose for a garden. In a letter received from the Secretary on Jan. 25 last, he admitted that mistakes had been made; but he refused to entertain the claim for a return of the money, stating that one of the Judges had decided that the question as to a rate once paid could not be reopened. Still the Secretary admitted that there had been an overcharge.

Mr. KEBBELL (emphatically): He does not.

The COMMISSIONER (to Mr. Cushing): You had better go on, and prove your charge.

Mr. KEBBELL: Then we shall have to go before the Registrar.

The COMMISSIONER: I only wish in this country we had an autocrat, because, if we had, and his attention were called to this matter, he would look out, call the nearest constable, go into the house, and settle the thing at once.

Mr. KEBBELL: The County Council are bringing in a measure to deal with things in that way.

The COMMISSIONER: Then I should be a strong supporter of the County Council. Here is a man who has been paying 5s. a year too much, and not complaining; and at the end of six years he comes complaining that he has been robbed with his eyes open.

Mr. KEBBELL: In going before the Registrar, I shall open up the whole of the accounts for the past six years; and I shall be able to show that the plaintiff has not been charged enough.

Mr. CUSHING: There is a statutory defence already made, to which I wish to call the attention of the Court.

The COMMISSIONER (to Mr. Kebbell): You can file a counter-claim, if it comes to be a matter of account, before the Registrar. That is the best way to settle it—go to the Registrar.

Mr. CUSHING: This is the first time this point has been raised, and the correspondence shows——

The COMMISSIONER: My 30 years' experience shows that you should never have any correspondence, it only raises bad feeling.

Mr. CUSHING: I only wanted to say that, if the defendants are successful in their claim under the Statute of Limitations, it would only make a difference of about 10¾d. in the amount due; and to save that sum a Solicitor is instructed to defend.

The COMMISSIONER: How is a Solicitor to live unless this sort of thing goes on? I send the case to the Assistant-Registrar, and give the defendants leave.

On going before the Registrar, the 21st inst. was fixed for the further hearing of the case.

BOW COUNTY COURT.—Friday, March 8.

(*Before His Honour Judge* FRENCH.)

A Claim under the Employers' Liability Act.

To-day a labourer named James Knight claimed £250 damages for personal injuries, under the Employers' Liability Act, from Anthony Facey, of Clover Road, Forest Gate, and from the Horseley Company, Limited, of Tipton, Staffordshire.

Mr. MOYSES appeared for the plaintiff; Mr. TATLOCK represented the defendants.

Mr. MOYSES, in opening the case, said he would prefer to deal at once with a preliminary objection taken by the defendants, that the notices in this action had not been delivered within the proper time. The Act said that notice must be served within six weeks of the accident. This happened on the 17th of September last; and the notice should have been served on or before the 29th of October. On the 25th, the plaintiff's Solicitor sent a notice by registered letter addressed "Mr. Facey, Builder and Contractor, Forest Gate." Facey was the only employer the plaintiff was acquainted with—he knowing nothing of the Horseley Company. Four days later, this notice came back through the Post Office as insufficiently addressed. On the 29th, another letter, enclosing the first, was sent addressed to "William Facey, 91, Clover Road, Forest Gate." This was delivered. After this reached Facey, it was discovered that the real name was Anthony Facey; William, his son, being only a foreman. It was then discovered that the real defendants were the Horseley Company—a large limited company in Staffordshire.

His HONOUR: Was this second notice in time?

Mr. MOYSES said it was not strictly in time; but an important fact was that, on Dec. 10, Mr. Batting, the Chief Manager of the Company, called upon the plaintiff's Solicitor, admitted his Company's liability, and agreed to sign, on behalf of the Company, a letter to that effect. But he had counted without the Employers' Liability Insurance Company, who were really fighting the case; and they dissuaded him from admitting liability—preferring to defeat the just claim of an injured man on a mere technicality.

His HONOUR said the first notice was clearly in time.

Mr. TATLOCK: But it never reached anyone. Facey was neither a builder nor a contractor; and the letter was not delivered. The Company's offices were not at Forest Gate, but at Westminster and Tipton.

His HONOUR said it would depend entirely on the facts of the case whether the first notice was or was not in time. He ordered the case to go on.

Plaintiff was then called, and gave evidence as to the accident he had sustained. He said that on Sept. 17 last he was engaged in constructing a large purifier at the Beckton Gas-Works. It was 50 feet long, 30 feet broad, and 10 feet high; the sides being made of large iron plates. He and a man named Taylor were directed by the foreman to take the chains off one of these plates after it had been lowered by a crane. Owing to a defect in the foundation on which the plate was to rest, it tilted over, and fell upon Taylor and himself. Taylor was killed, and witness was crushed against an iron girder. He sustained severe abdominal injuries, which necessitated his undergoing an operation in a hospital; and he was now unable to follow his employment. He always looked upon Facey as his employer, and knew nothing of the Company. Facey employed as many as fifty men.

At the conclusion of the plaintiff's case,

His HONOUR said he was not going to give judgment against the plaintiff on the ground of insufficient notice. He held that the service upon Facey was sufficient for the Company, and that the letter first sent to him was addressed as correctly as the workman was able to do it. With regard to the first part of his ruling, he thought the law was quite clear. Otherwise a great company might employ a manager who held himself out to the workmen as a contractor and paid the men their wages. They might be building a dock, and hundreds of men might be injured. The contractor or manager, in the mere receipt of a salary, could not pay the damages, and it would be rendering the Act null and void if the company could be cleared of their liability by such action.

Mr. TATLOCK: I should argue in that case that the company were not liable.

His HONOUR: What? When they were taking all the profits? That would never do. With regard to the other point, I hold that the first letter was properly addressed, having regard to the position of Facey as the manager of some fifty workmen in the neighbourhood; and that was the only address the plaintiff knew.

Judgment was eventually given for the plaintiff for £100 damages, with costs.

LISKEARD COUNTY COURT.—Monday, March 4.

(*Before His Honour Judge* GRANGER.)

The Payment for Water Used for Flushing Water-Closets.

In this case (which involved a question of some importance to water companies), the Liskeard Water Company claimed of Henry Hocken £1 1s. 8d. being two years' arrears of water-rent. Defendant had paid 16s. 8d. into Court, leaving 5s. in dispute.

Mr. B. CHILDS appeared for the plaintiffs; and Mr. A. W. VENNING, for the defendant.

Mr. CHILDS explained that, under their Act, the Company were entitled to make a minimum charge of 4s. 4d. per year for the supply of water to a house occupied by one family without a water-closet, and 10s. if the supply to a water-closet was included. In December, 1892, the Town Council pointed out that there were a great many cottages in the borough without any proper water-closet accommodation, and suggested that, before they insisted on the provision of proper accommodation, a cheaper supply of water for flushing should be arranged. To meet the case, the Company agreed to charge 2s. 6d. a year for each water-closet in addition to the ordinary charge to a house without a closet. In the present instance, the only matter in dispute was the two years' charge of 2s. 6d. per annum in respect of the closet. In documents filed by the defendant, it was admitted that his family had the use of a pan water-closet common to two cottages. The defence was that the closet was flushed by foul water already used for other purposes. But it was immaterial whether the water used for flushing was clean or foul. If the defendant's contention was correct, there would be a considerable amount of peculation of the Company's water. Hundreds of people used these pan closets; but they objected to pay for the water used in flushing them unless their landlords put in a proper cistern. The Company did not supply water for flushing. They supplied water for domestic purposes, which included a supply for the closets; and, provided the apparatus was of a character of which they could approve, they did not care how the closet was flushed. He argued that it was immaterial whether a closet was flushed with water used before or not. In either case, it was water supplied by the Company.

Mr. VENNING, for the defence, said this was a test case affecting a large number of others. It concerned more especially the poorer section of the community—people occupying small dwellings with one closet for the joint use of two houses. In the case of the terrace where defendant lived, the Medical Officer of Health had certified that the closets could be properly flushed by water previously used for washing and other purposes, and that there was no necessity to place a cistern or tap in the closet. He contended that the Company could only make the extra charge for a supply of water to a closet. In the present instance, there was no tap, cistern, or other medium of water supply in the closet. The only supply on the premises was a tap in the dwelling-house. Defendant's closet was flushed with soiled water. But even if he had used clean water, it could not be regarded as a supply of water to the closet; and plaintiffs would not be entitled to recover this extra charge.

His HONOUR, in giving judgment, said, although the amount was small, the point involved was an important one. Whether merely throwing water in from a pail was a satisfactory method of flushing a pan water-closet, was a question for the Sanitary Authority. All he had to decide was whether plaintiffs were entitled to charge an extra rent for water used for flushing which had been supplied for other purposes. He could not understand how a closet could be supplied with water when there were no pipes to take it there. In this case he must assume that the water used for flushing had been previously used for washing or some other domestic purpose; and in no way could the Company be injured. Water having been once used became the property of the person who had paid for it. If the householder chose to store dirty water, or employ it for some other purpose, the Company could not make an extra charge for it, for it was no longer their property. Possibly his decision would hurt the Company; but he had nothing to do with that. Defendant was not liable for the extra rent; and he therefore gave judgment for him with costs.

Leave was given to appeal, on condition that the Company paid the defendant's costs.

A Gas Collector Charged with Embezzlement.

At the Bow Street Police Court, last Friday, Charles Ross, a collector, formerly employed by The Gaslight and Coke Company, was charged on remand, before Mr. Lushington, with embezzlement. Mr. C. O. Humphreys prosecuted; the prisoner was defended by Mr. Crawshaw. Accused had been in the service of the Company for 15 years, and during the latter portion of the time had received a salary of £360 a year. In December last, the Company received a notice from their bank that a cheque for £314 10s. paid into their account had been dishonoured. Inquiries were made; and it was ascertained that the prisoner had paid the money into his private account. He was suspended, and directed to attend at the Company's office at the next board meeting. He absconded, however, and was arrested in America. Prisoner admitted having misappropriated money paid to him on behalf of the Company; and he was committed for trial.

The Prepayment System at Lancaster.—At the last meeting of the Lancaster Town Council, Mr. Helme, in moving the confirmation of the Gas Committee's minutes, referred to the gratifying fact that there had been an increase of 5·37 per cent. in the quantity of gas consumed in the nine months just ended. Alderman Bell asked why the Committee had decided to put in prepayment meters only where the houses did not exceed the rateable value of £9. If there was any advantage in the use of the new meters, why should not a person rated at £9 10s. or £10 have the same privileges, conveniences, or advantages as the person rated at £9? Mr. Helme replied that it was thought that, by fixing upon the houses with rateable values of not more than £9, they would be able to feel their way for the time being. It was proposed to review at a later period the limit now fixed. Alderman Bell said it seemed to him, as he had ventured to suggest at the previous meeting, that the adoption of the new system would turn out to be a costly mistake. If prepayment meters were going to be more expensive than others, why put in any? If the arrangement was a good one, why not make it as wide as possible; and if it was not a good one, they should not adopt it at all. Alderman Kitchen thought it would be a mistake to put a restriction on the class of houses in which they proposed to fix the prepayment meters. Alderman Smith said what had been advanced confirmed his doubts of the wisdom of the price that had been fixed for the supply of gas by the prepayment system. If they looked at the trouble and cost that attention to the meters involved, the Committee would have been on safer ground had they fixed at 25 the number of feet of gas to be supplied for 1d. The large expense incurred in fitting up the new meters for a small consumption of gas suggested to his mind that the 3s. 1d. per 1000 cubic feet proposed to be charged was not enough, and would not allow sufficient margin. Mr. Helme said the proposed arrangement was only a temporary one; and it was the desire of the Committee to supply gas to poor people at as small a cost as possible. They therefore decided to give as much as they could for 1d.; and they proposed to initiate the new system with as little change as possible for the present. The minutes were then confirmed.

MISCELLANEOUS NEWS.

PROVINCIAL GAS AND WATER COMPANIES.

The majority of the Provincial Gas and Water Companies having now held their general meetings, our record of the proceedings of these undertakings, in the form in which it has been presented during the past few weeks, will scarcely be required after the present issue of the JOURNAL. The subjoined particulars have lately come to hand.

Gas Companies.

The annual general meeting of the Exeter Gas Company was held on the 26th ult., when the usual dividends were declared, and a sum of £1952 was carried to the reserve fund. The price of gas has been reduced from 3s. 1d. to 3s. per 1000 cubic feet as from the 1st of January.

At the recent half-yearly general meeting of the Harrogate Gas Company, the Chairman (Mr. C. Allanson), in moving the adoption of the report, already noticed in the JOURNAL, referred to the extensions now in progress at the works, under the advice of Mr. T. Newbigging, M.Inst.C.E., and he stated that he hoped they would be completed by the end of the present year. He said it was the desire of the Board to have a thoroughly up-to-date manufacturing plant; and he believed their aim would be realized. But this could only be by capital outlay; and the Directors would have to ask the proprietors to sanction the raising of additional capital. Passing on to review the revenue, he complimented the proprietors on the result of the past year's work. He said the consumption of gas had increased; and, owing to the development of the cooking and heating business and the rapid growth of the town, he confidently anticipated better results in the future. As they would be aware this was the Jubilee of the Company; and the Board had decided to commemorate it by making such a reduction in the price of gas as would be appreciated by the consumers. It was their intention to reduce the gross price from 3s. 4d. to 3s. from the 1st of July next. The class of consumers affected by this reduction of 4d. per 1000 cubic feet would be the Corporation and the consumers who had quarterly accounts. It was not possible to extend the advantage to the weekly collection system, as at the inauguration of this system the rate had been fixed too low, taking into consideration that the price charged included meter-rent, and the expense of collection was necessarily more than that entailed by the quarterly accounts. Up to the present, this particular class had been deriving an undue benefit. This, however, would be remedied after the 1st of July. Owing to the action of The Gaslight and Coke Company in abolishing meter-rents, this question had been raised. His view was that a reduction in the price of gas was more equitable, as being an advantage to all in proportion to their consumption; whereas the abolition of meter-rents was not so. In proof of this, he gave the following figures: The allowance of meter-rent to a consumer of £4 per year would be equal to 2d. per 1000 cubic feet; but to another consuming £8 worth of gas, only 1d. Still more striking instances might, he said, be given. Speaking of recent inventions affecting gas manufacture and supply, he assured the proprietors that the Board recognized the importance of being kept informed as to the development of discoveries calculated to serve the Company and the consumers, whose interests were inseparably connected. At the present early stage, it was not possible to gauge the value of the new discovery of producing acetylene from calcic carbide, so ably introduced to the scientific world by Professor Vivian B. Lewes, and to a certain number of favoured members of the community of Harrogate by Mr. Samson Fox. It was attracting much consideration in the gas world; and the view was entertained that it might prove to be one of the most valuable enrichers of ordinary coal gas. The report was adopted; and subsequently the necessary resolution was passed authorizing the issue of £5000 of debenture stock.

The half-yearly meeting of the Hastings and St. Leonards Gas Company was held last Thursday; and the report and accounts presented by the Directors were of the usual satisfactory character. It was stated in the former that, in accordance with the announcement made at the last meeting, the price of gas was reduced at the beginning of the year to the uniform rate of 3s. 2d. per 1000 cubic feet throughout the district; but the extremely mild and fine weather which prevailed for so long a time at the latter part of the year, prejudicially affected the sale of gas, &c. Owing to numerous representations made by consumers as to the desirability of the Company undertaking the supply and fixing of internal fittings, burners, &c., as formerly, the Directors said they had decided to re-establish this branch of the business; and a commodious show-room, adjoining the offices, would be erected during the present year. The report also mentioned that the reconstruction of No. 3 gasholder was being proceeded with. The accounts annexed to the report showed that the expenditure on capital account for the half year was £1618; making a total of £217,095. The capital receipts to that date only amounted to £212,353; so that there is a debit balance of £4742. The total revenue on the six months was £37,396, made up as follows: From gas, £28,213; meter and stove rental, £1239; residual products, £7784; rents, £76; and miscellaneous receipts, £84. The total expenditure was £28,048, of which £23,868 was spent in the manufacturing department; £1335 on distribution; £551 on the lighting and repairing of public lamps; £934 on rates, taxes, and insurance; and £1126 on management; and the balance was made up of law charges, bad debts, and superannuations. The profit-balance was £9348; and from this a dividend at the rate of 12 per cent. per annum on the £25 shares, and at the rate of 9 per cent. on the £20 shares, was declared. The statements referring to the manufacturing operations showed that the coal carbonized and used amounted to 16,454 tons, of which 246 tons were cannel. The quantity of gas made was 169,062,000 cubic feet, of which 165,797,900 feet were accounted for. The estimated quantities of residuals produced were: Coke, 10,123 tons; breeze, 812 tons; tar, 157,163 gallons; and ammoniacal liquor, 345,506 gallons.

The annual meeting of the Hoddesdon Gas Company was held on the 28th ult. The balance-sheet and working statement made up to Dec. 31 last by Messrs. Alfred Lass, Wood, and Co., showed receipts to the amount of £3482; expenditure, £2211—the net profit for the year being certified as £1271. The balance at the credit of the profit and loss account amounted to £1755, out of which dividends were recommended at the rate of £8 15s. per cent. on the original, and £6 2s. 6d. per cent. on the new shares for the year. The quantity of coal carbonized was 1460 tons. The gas made per ton was 10,309 cubic feet; and sold, 9324 cubic feet—the loss by leakage amounting to 7 per cent. of the make. The capital employed per ton of coal carbonized is equal to £11 6s.; and the profit, as per the revenue account, is 1s. 10d. per 1000 cubic feet of gas sold. It was unanimously resolved to reduce the price of gas by 2d. per 1000 cubic feet after the 1st prox.; making it 4s. net. The report presented stated that Mr. F. Smallbone had been appointed to fulfil the duties of Secretary as well as Manager.

It was reported by the Directors at the half-yearly meeting of the Lewes Gas Company last Wednesday that the revenue account showed a profit for the six months of £1611. After providing for the interest on mortgages, &c., the balance of net revenue was £1697. It was recommended that a dividend of £5 per cent. for the six months should be declared, amounting to £1299 (after deducting income-tax). In moving the adoption of the report, the Chairman (Mr. J. Broad) congratulated both the shareholders and the consumers on the fact that, in the period under notice, the Company were able to give a greater pressure and an illuminating power of one candle more than in 1893. Moreover while the London Gas Companies raised the price of gas during the coal strike, they did not do so; but went on at the old price, which unfortunately for the shareholders had been reduced shortly before, and that had had the effect of reducing the dividend. However, they hoped in the future, with the lower price of coal and success, that they might recoup the shareholders for the loss they had hitherto sustained. He also spoke highly of the management of their works by Mr. Levi Monk. The motion was unanimously carried.

Judging by what transpired at the annual general meeting of the Londonderry Gas Company, held on the 1st inst., under the presidency of Mr. W. Tillie, D.L., the shareholders have no reason to fear that their undertaking will be eclipsed by the progress of the electric light. The Directors reported that the revenue in the past year amounted to £15,364; the expenditure, to £10,683—leaving a net balance of £4681 available for distribution. They recommended a dividend of 10 per cent., free of income-tax. The Chairman, in moving the adoption of the report, alluded feelingly to the loss the Company had sustained by the death of Mr. Newton, his predecessor in the chair, to whose ability he testified. Dealing with the affairs of the Company, he congratulated the proprietors on the success which had attended the operations of the past year. It was true, he said, the Company had lost a considerable portion of the street lighting, owing to the introduction of electricity; but the loss was not so great as it might appear. There had been a satisfactory increase in the consumption of gas; and, if it went on, he had no doubt that, in the near future, without the street lighting, the revenue would be quite as good as, or even better than, it was. The Directors had reduced the price of gas 3d. per 1000 cubic feet to the private consumers, and 5s. each upon the remaining public lamps, including those of the Harbour and Bridge Commissioners. These reductions amounted to something like £800 per annum. He thought a change of this kind, which threw off £800 of the revenue in the working of a small concern like theirs, was very liberal indeed, especially as they could have divided it. The Directors had had under consideration the idea of reducing the meter-rents. This would have been equivalent to something like 1½d. per 1000 cubic feet—about half the reduction actually made; but they did not see their way to do this at present, and pay the ordinary dividend. Having referred to various other matters incidental to the working of the undertaking—such as the disposal of residuals, the adoption of prepayment meters, and the use of gas for heating and cooking purposes—the Chairman called the attention of the meeting to the new systems of producing gas; remarking that in Belfast Mr. Stelfox seemed to have made water gas a success. Others had done well with the Peebles process; and the new method of producing acetylene was expected to give good results. While the Secretary (Mr. John Macnie) was watching these things carefully, and was ready to adopt any of them that might be efficient and profitable, the Directors thought the time had not come for increasing the plant for any of these purposes. As regards the increased consumption of gas, he had no doubt, from the experience of the present year, and in view of the fact that on many days they had made a "record" quantity of gas—larger without the street lighting than ever it had been with it—and from everything they could see, they might look forward to increased consumption. During the past twelve or thirteen years, there had been an advance on private consumption of something like 50 per cent.; so that he thought he had been able to put before the proprietors such a view of the state of the Company and its prospects as should make them feel they had their money invested in a prosperous and progressive industry. Sir W. Miller seconded the motion; and it was carried unanimously. The proceedings closed with votes of thanks to the Directors, Mr. Macnie, and the officials.

The accounts presented at the 35th annual general meeting of the Longwood Gas Company were satisfactory. The Chairman (Mr. E. Armitage), in moving the adoption of the Directors' report, remarked that there were one or two matters in regard to their business which were peculiarly gratifying to them. One of their largest consumers had adopted the electric light; but spite of this, the gas-rental was practically the same as in the previous year. The coals carbonized were upwards of 300 tons less; and the cost of purification had never been lower. Their Manager and Secretary (Mr. J. L. Mitton) paid a great deal of attention to this department; and, in his opinion, both the method and economy had reached perfection. Although the dividend was the same as before, he was pleased to note that, with the profits made, they could have paid a higher one. But he, for one, preferred to have a small nest-egg in reserve; and this was why the balance of £321 was carried forward. There was one item in the general balance-sheet which showed a very marked improvement, due to the skilful management of the works. This was the reduction in the number of unpaid accounts. The Vice-Chairman (Mr. R. Thornton) having seconded the motion, Mr. B. Broadbent pointed out that the rates and taxes amounted to 8¼ per cent. in 1881, whereas in 1894 they were 23 per cent. This, he said, clearly showed one of the difficulties in the way of high dividends being paid. In acknowledging a vote of thanks to himself and the

Directors, the Chairman mentioned that their Manager and Secretary devoted the utmost attention to his duties, and studied in every way to promote the welfare and success of the Company.

The annual general meeting of the Maldon Gas Company, Limited, was held on the 28th ult.—Mr. W. K. Digby in the chair. In their report, the Directors referred to the increased sale of gas and the reduction of the leakage; and they stated that £200 had been charged to the net revenue account in respect to capital expenditure. The amount available for division was £1042. A proposition was submitted that a dividend of 30s. on the "A" and 10s. on the "B" shares should be paid. To this an amendment was proposed that the dividend should be 20s. on the "A" and 6s. 8d. on the "B" shares. In support of the amendment, it was urged that a reserve fund should be formed for equalizing dividends; no dividend having been paid for the last three years. Discussion followed; and ultimately the original proposition was carried. This will leave about £450 to be taken forward.

At the recent meeting of the Sevenoaks Gas Company, it was announced that the receipts in the six months ending Dec. 31 last amounted to £5612, and the expenditure to £3659; leaving a balance of £1953. Dividends were declared at the rates of 10 and 7 per cent. per annum.

According to the statements laid before the shareholders of the Shotley Bridge and Consett Gas Company at their meeting last Friday, the business of the half year ending Dec. 31 last shows gratifying progress. In the six months 23,078,000 cubic feet of gas were sold; which is an increase of 8½ per cent. on the corresponding period of 1893. The total receipts amounted to £4390, and the expenditure to £2734; showing a balance-profit of £1656. After paying the interest on loans, £1590 was available for dividends of 5 and 3½ per cent. The report was adopted; and a resolution was passed authorizing the Directors to raise £2000 of loan capital for further extensions of plant.

The half-yearly general meeting of the Watford Gas Company was held on the 27th ult.—Mr. E. J. Slinn presiding. The Chairman, in moving the adoption of the report, congratulated the proprietors on having had a satisfactory half year. The Directors had been able to reduce the price of gas from 4s. 3d. to 3s. 4d. per 1000 cubic feet; and they hoped to bring it down to 3s. before very long. With the view of stimulating the consumers to a higher appreciation of the value of gas, they intended to have an exhibition; and they were about to facilitate the use of gas by the working classes by introducing prepayment meters. The report was adopted. The retiring Directors having been re-elected, Mr. Broad proposed that a change should be made in the Company's Auditors (Messrs. Alfred Lass, Wood, and Co.); and he submitted the name of a gentleman to discharge the duties. Mr. Lake seconded the motion. Mr. Pearkes suggested that the present Auditors should be re-elected. Mr. Broad's proposition was, however, carried. We understand that the reason of Mr. Broad's action was that the outgoing Auditors had objected to the manner in which the Directors proposed to deal with certain amounts written off on account of capital expenditure.

Water Companies.

The ordinary half-yearly meeting of the Dorking Water Company was held on the 26th ult.—Mr. R. Barclay in the chair. The Directors reported that the receipts in the six months ending Dec. 31 last had been £1273; and the expenditure, £367—leaving a net profit of £906. There was a sum of £1078 available for division; and the Directors recommended dividends at the rates of 6, 7, and 8 per cent. per annum on the three classes of shares. This would absorb £1070. In moving the adoption of the report, the Chairman said the ordinary water-rates were increasing, but those for supplies by meter and for building purposes had decreased. The expenses, he thought, were kept within most moderate bounds. They had experienced very severe weather during the past month or six weeks; but he thought the Company had done better than in the year 1891-2. Of course, it was rather early to tell what damage had been done; but he did not think that their main had been absolutely frozen, although many people had been deprived of water by their pipes freezing up. The Manager (Mr. W. J. Rossiter) had been doing what he could to lessen the inconvenience. The report was adopted; and the dividends recommended were declared. A hearty vote of thanks was accorded to Mr. Rossiter for his efforts to cope with the difficulties arising from the recent severe weather. In returning thanks, Mr. Rossiter said that, except by one or two cantankerous people, he had been very fairly met; and in many instances he had received the people's thanks for what he had tried to do.

The Leatherhead Water Company held their half-yearly meeting on the 26th ult.—Mr. H. Rokeby Price in the chair. In the report, the Directors stated that the receipts for the six months covered by it amounted to £1243, and the working expenses to £559; leaving a profit of £684. Adding £418 brought from the previous half year, made a total of £1102. Deducting from this sum £125, the interest on debenture stock, there remained £977, which would pay a dividend at the rate of 3½ per cent. per annum, and leave £554 to be carried forward. There had been a short extension of main at Leatherhead; and a few new services had been put on. To meet the expense of providing the new Worthington engine, and for such other increase of plant as might shortly be found to be required, the Directors stated that they had determined to issue by tender 100 shares of £10 each. The Chairman briefly moved the adoption of the report; remarking that the Company would, no doubt, be required to supply more water in the future, as the population was increasing. Colonel Gleig seconded the motion, which was agreed to; and the dividend was declared.

At the half-yearly meeting of the Sevenoaks Water Company on the 25th ult., the Directors reported that the revenue during the six months ending Dec. 31 last was £132 less than in the corresponding period of 1893, owing to a reduction in the charges and to a few large houses standing empty. The balance to the credit of the profit and loss account was £1135, out of which the Directors recommended a dividend at the rate of 8 per cent. per annum. This would absorb £1018, and leave a balance of £117 to be carried forward. The capital outlay had advanced to £38,489; and the increase included £315 expended on the new well. This was approaching completion, and would soon be placed in direct communication with the existing well. When this was done, the Manager (Mr. F. Hunter) believed there would be a substantial saving in the cost of pumping. It would, the Chairman added, be necessary to raise shortly a further £1000 or £1500 of new capital. The report was adopted.

The half-yearly general meeting of the South Staffordshire Water Company was held on the 28th ult.—Mr. Frank James in the chair. In moving the adoption of the report, which was noticed in the JOURNAL for the 19th ult., the Chairman remarked that the number of houses laid on during the six months ending Dec. 31 last was 1962; making the total supplied 85,294, as compared with 81,494 at the corresponding period of the previous year, or a total increase of 3800. They supplied 450,000 people, which spoke volumes for the great advantages the community derived from the services of the Company. The gross amount of water-rates for the half year was £43,492, as against £42,000 in the corresponding period of 1893. The Directors had transferred £1000 to the depreciation fund—making the fund £8813; and he trusted that next year it would be raised to £10,000. He explained that the engine charges had decreased to £4754, as compared with £5595 at the corresponding period; the extra cost in 1893 being caused largely by the coal strike. Alluding to maintenance charges, he remarked that since the making up of the balance-sheet the Company had experienced the effects of the severe frost; and they had been doing everything possible to remove some of the difficulties the water consumers laboured under from the artificial supply. Throughout the frost, the consumers had shown very good temper, and, with but few exceptions, they had willing and ungrudgingly paid their rates. They recognized that the Company had done the best they could in the circumstances. The cost of maintenance was sure to reach a considerable figure at the end of the next half year; and it was satisfactory, therefore, that they were carrying forward a large balance by which it might be met. Sir H. Wiggin seconded the motion, and it was carried. A dividend at the rate of 5½ per cent. per annum for the half year on the ordinary stock was then declared. The Chairman subsequently moved that, in consideration of the long and faithful services of the late Engineer, Mr. William Vawdrey, a grant of £500 should be made to his widow. This was seconded by Sir H. Wiggin, and carried.

The Lighting of the City of London.—The Engineer to the London Commissioners of Sewers (Mr. D. J. Ross, M.Inst.C.E.) has presented his report on the works executed by the Commissioners in the past year. With regard to gas lighting, the lamps employed are square and circular in shape; and the quantity of gas consumed therein ranges from 5 to 50 cubic feet per hour, the charge for which is at the rate of 2s. 3d. per 1000 cubic feet. The total annual charge for gas, lighting, and repairing, ranges from £3 6s. 4d. (square) and £3 10s. 7d. (round) to £25 13s. 9d., for 4300 hours per annum. The difference in charge between the square and circular lamps is owing to the extra expense incurred for cleaning and maintenance. The number of defective lights last year was 113, which is below the average of former years. The 36 meters attached to the public lamps in various parts of the City showed that the full contract quantity of gas was furnished at those lamps; and the inspectors are of opinion that this is generally the case. In accordance with the practice for many years past, the lamps were lighted during the prevalence of fog. As to electric lighting, there were at the close of the year 483 arc lamps in use, spread over about 13 miles of main thoroughfares. As 1338 gas-lamps had then been discontinued, the proportion was about three to each arc light. The question of lighting the minor streets by electricity is under consideration; experiments having been made with incandescent lamps as well as with alternating current arc lamps in Basinghall Street and Aldermanbury.

Salaries of Officials in the Stockport Gas Department.—A proposal of the Gas Committee to make certain advances in salaries in their department led to an animated debate at the meeting of the Stockport Town Council last Wednesday. The action of the Committee was defended by the Chairman (Mr. T. Webb); and he was supported by Mr. Lister. The inevitable argument that the time was inopportune because trade was bad was well met by figures quoted by the latter gentleman, which showed that the business of the Gas Department at any rate was not suffering. In 1891 (the year preceding that when Mr. S. Meunier was appointed Engineer), the rental was £52,500; the next year it increased to £57,000; and last year it went up to £61,500. In 1890-1, with a rental of £52,500, the Corporation were paying their then Engineer £600 a year. An amendment was proposed referring back to the Committee for further consideration the increases in the salaries of three of the officials—Messrs. Meunier, Bedford, and Robinson. This received support from Mr. Burrows, who summed up the result of the past few years' working of the department as follows: Bad gas, increased price, loss of customers, and small profits; and this in face of the fact that they had spent £54,000 upon the development of the works. Other speeches were made both for and against the advances; and then Mr. Webb replied. Referring to the various causes for the reduced profits a year or two back, he stated that the changing of the shifts from twelve hours to eight hours had necessitated the engagement of 50 additional men, many of whom were inexperienced. Proportionately, the expenses were lower and the profits greater than in the case of the Manchester Gas-Works. Stockport obtained 10,441 cubic feet of gas per ton of coal; while Manchester only produced 9335 cubic feet. As to profits, Manchester made 1s. 8d. per ton; while Stockport made 3s. 9d. Comparing Mr. Meunier's salary with that which was received by Mr. Jacques (his predecessor), Mr. Webb said that the latter received £400 a year when the make of gas was only one-fifth of what it was now; when Mr. Jacques received £500, the make was only one-third of the present amount; and even when he received £600, they only turned out about half the present quantity. Mr. Meunier, too, had been responsible for the design of all improvements; while Mr. Jacques, when he designed the extensions at Portwood, received £300 in gratuities. The expenses in salaries during Mr. Jacques's time averaged £1 15s. 7d. per million cubic feet of gas; while Mr. Meunier even after this increase would receive but £1 5s. 7d., or 10s. less. The cost in 25 neighbouring towns was £2 2s. 2d. The amendment was eventually carried by twenty votes to fourteen.

HARROW DISTRICT GAS COMPANY.

The Half-Yearly Meeting of this Company was held yesterday week, at the Albion Tavern, Aldersgate Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY and ENGINEER (Mr. J. L. Chapman) having read the notice convening the meeting,

The CHAIRMAN, in moving the adoption of the report and accounts, said that it would be seen by the former that at Lady-day the Harrow and Stanmore Gas Companies would become one undertaking. The Harrow Company was founded by the late Mr. John Chapman in 1854, and the Stanmore Company was formed by the same gentleman four years later. They supplied adjacent districts; and in uniting them they would be carrying out Mr. Chapman's original idea. The mains connecting the two districts had been laid since the last meeting. A 12-inch main now extended from the works at Harrow beyond the North-Western Station—a distance of nearly three miles. By these new mains they were enabled not only to carry gas to Stanmore, but to improve the supply on the way. The 10-inch main that was formerly at the gas-works had been taken up, and a 12-inch one substituted; and by 10, 8, and 6 inch mains, it had been extended to Stanmore, and then on to Edgware. The laying of these mains had had the daily superintendence of their Engineer. Mr. Chapman, like him (the Chairman), had a horror of unaccounted-for gas; and therefore, as far as he could influence the perfect laying of the mains, he had done so. They had not, however, quite avoided leakage; but they had reduced it to a minimum. The total length of the mains laid was 7¾ miles. These were completed in October; and from then the whole of the gas distributed in Stanmore had been supplied, under contract with the lessee, from the Harrow works. They had thus already had experience as to what they would have to do; and therefore there would be no further difficulty at the time of the amalgamation on Lady-day. The second paragraph in the report referred to a reduction of 3d. in the price of gas throughout the whole of the district of the Harrow Company. The new Act only provided that it should be lowered in the town district; but the Directors had resolved that the reduction should extend to the whole of their present area. This had not affected them to any great measure, as it only applied to the period from Sept. 29 last, from which date to the end of the year it was very mild, and not much gas was used. The price of gas in Stanmore in 1892 was 5s. 8d. per 1000 cubic feet; but it had been gradually reduced by the lessee until it was now 4s. 9d.; and on Lady-day it would be brought down to 4s. 6d. Now 4s. 6d. still sounded, to residents in London or in those districts situated near coal-mines, a high price. Only recently he had referred to this matter in connection with another Company, and pointed out that a suburban and an urban district were very different indeed. That other Company occupied a district where there was no water conveyance; and they had to pay 9s. per ton for the carriage of coal. They were even worse off in Harrow. They also had to pay 9s. per ton; but that only brought the coal as far as the railway station, and it cost 2s. in addition to place it on the works. That was to say, supposing they paid 7s. or 8s. per ton for coal at the pit mouth, they had to pay 11s. more before they could get it delivered to their works. The cost of coal must influence the price of gas, which consequently must vary in different parts of the country. Harrow was a thinly populated district; and on 25 miles of mains, they had 707 customers, which gave an average of only 29 customers per mile. Therefore, if they considered the high cost of coal and the comparatively few consumers, it would be seen that, until one or other changed, the price must always be higher at Harrow than in an urban district. Turning to the accounts, the first thing that struck him was that they had paid £185 more for coal; but coal had been at a much less price than in the corresponding period of 1893. Then there was £98 more for wages on the works. But they might take it that there was no comparison, as part of the coal used since October had been for making gas to supply Stanmore; and part of the increased amount paid for wages was also due to the same cause. Regarding the residuals, coke had fallen in price as coal fell; tar was about the same; and they had made 27 tons of sulphate of ammonia, carbonizing 2431 tons of coals, which was very good indeed. On the whole, the residuals did very well. Coming to the amount of gas produced, he was quite at a loss, as it was impossible to measure it, as the old meter was removed to make place for a new one, and was taken to Stanmore for use in measuring the gas consumed there. Then in laying the new pipes, it was utterly impossible to avoid loss by leakage. Therefore, the works being in a state of transition, he could not make his usual comparison with the corresponding period of 1893. The profit upon the half-year's working was £1738, as against £1640, which was £98 more. This was satisfactory, as it showed they had earned their dividend and were enabled to carry a little forward with the undivided balance. In conclusion, he said Mr. Chapman had introduced incandescent gas-lights into the High Street, Harrow; and he was very well satisfied with the results.

Mr. C. HORSLEY, J.P., seconded the motion, which was unanimously carried.

Dividends at the rate of 7½, 7, and 5¼ per cent. per annum on the various classes of capital having been declared,

The retiring Director (Mr. A. H. Baynes) and the Auditor (Mr. J. Randall) were re-elected.

Mr. A. F. PHILLIPS next moved a resolution increasing the remuneration of the Directors to £420. He pointed out that, during the past two years, the Directors had had a great amount of work to perform, especially in obtaining the recent Act of Parliament, and arranging for the approaching amalgamation with the Stanmore Company. He believed the Directors had continued to work for several years at the same remuneration, notwithstanding the fact that the business of the Company was developing considerably; and in the future their duties would be largely increased.

Mr. SAMUEL CUTLER seconded the motion, which was unanimously adopted.

On the proposition of Mr. HORACE RYDON, seconded by Mr. CHARLES GANDON, the fees of the Auditors were increased to £30 per annum; and afterwards Mr. Chapman's salary in respect of his secretarial duties was raised to £150 per annum, on the motion of Mr. CUTLER, seconded by Mr. NOWEIKOWSKI.

The usual complimentary votes terminated the proceedings.

THE DUBLIN CORPORATION IMPROVEMENT BILL.

Another Poll of the Burgesses to be Taken.

The Dublin Municipal Council have decided not to accept as decisive the recent poll of the burgesses on the Improvement Bill, the result of which was recorded in the JOURNAL a fortnight since. There are, it appears, 7668 burgesses on the roll, and of these 2198 voted against the Bill, leaving 5470 either unpolled or in its favour. Of these, 2085 voted for the Bill; leaving 3385 who did not express any opinion upon it. The Council believe that very many of the 2198 votes against the Bill were cast under misapprehension; and many were obtained through misrepresentations most industriously circulated as to the scope and character of the Bill.

The above decision was arrived at by the Council at their meeting yesterday week, when a report of a Committee of the whole house on the question was presented. This contained the figures above quoted, and ascribed the defeat of the Bill to want of knowledge on the subject, apathy, and misrepresentation, notwithstanding the steps which the Council had taken to enlighten the burgesses as to the nature of its provisions. The report also included a summary of the powers sought; among the matters dealt with being the water supply to the out-townships, and the relations between the Gas Company and the Corporation. The Bill, said the report, "seeks to enact that the methods now provided for testing gas shall be improved up to date, and the price now charged for gas readjusted, so as to secure that, while a fair price shall be paid for gas, it shall be of a good quality." The report concluded with a recommendation that the Council should again submit their resolution approving of the promotion of the Bill to a public meeting of the burgesses. The adoption of the report was moved by the Right Hon. the Lord Mayor, and seconded by Alderman Meade. This gentleman, in the course of his remarks, accused "their friends of the Gas Company" of having taken—or at all events he understood they had done so—an active part in voting against, and canvassing in opposition to, the Bill. He thought the Directors of the Company ought to be at one with the Corporation in seeking to have a termination put to the unseemly differences that had taken place between them for years past. He believed the Company had taken all their measures in London for opposition to the Bill, and having clauses inserted safeguarding their interests. Some time or other these differences must be submitted to Parliament; and he thought the Company would have been wise in taking advantage of this opportunity. On the water-works clauses, he could understand townships which had for years endeavoured to evade their just obligations opposing the Bill; but he could not understand how the citizens of Dublin could vote against it. There was little in the subsequent discussion affecting the questions in which our readers are interested; but one member—Mr. Beattie—charged the Council with having made an attempt to put down the Gas Company; and he did not think this was fair towards an industry which gave so much employment to the people. It was explained by the Law Agent (Mr. M'Sheehy) that the expenses of the second poll, if against the Bill, would have to be borne by those who had expended them; but if the Bill went on, and was passed, the clause in respect to the costs would cover all. It was also declared by the Lord Mayor that if the water clauses were passed, the Corporation ought to receive an additional rental of £4000 a year, which would be equal to 1¼d. in the pound; and with regard to the gas clauses, the saving to the citizens on their private gas bills would be very great indeed. The motion, as already intimated, was carried.

The Assessment of the Oldbury Gas Undertaking.—At the last meeting of the Oldbury District Council, the Chairman of the Gas Committee (Mr. J. W. Wilson) mentioned that application had been made to the West Bromwich Assessment Committee to reduce the assessment of the gas-works from £2400 to £1600; and that, after some argument, it had been brought down to £2000, which he was pleased to say had been accepted.

Suffocated by Gas.—Last Saturday week, a young man named Edwin Smith, who had been repairing a gas-pipe at Soho Hill, Birmingham, was discovered lying in an unconscious state in the cutting he had made for the purpose of reaching the pipe. He was at once taken to the General Hospital; but medical aid was useless, life being extinct. Death, it was stated, was due to asphyxia, consequent upon the inhalation of coal gas.

The Scarborough Corporation and the Gas Company's Bill.—We learn that, as the result of conferences which have taken place in London, between the representatives of the Scarborough Corporation and the Gas Company, all the questions at issue between the parties have been settled. As mentioned in our "Parliamentary Intelligence" last week, the petition against the Bill has been withdrawn; and the chances are that its progress through both Houses will not be impeded. The Bill as amended will carry out in every respect the arrangement arrived at a few weeks ago; the principal points of which have already been given in our columns (see *ante*, p. 382). We understand that the clause which occasioned the greatest difficulty was that providing that the holders of the new stock authorized by the Bill should, in the event of the compulsory purchase of the undertaking at any time hereafter by the Corporation, receive neither more nor less than the price at which it was originally issued. While assenting to the principle of such a clause, the Directors were anxious to have it embodied in such a form as to make it absolutely beyond doubt that the holders of the existing stock would not in any possible event be prejudiced by it. They therefore took the precaution of having this matter settled by one of the most eminent Queen's Counsel at the Parliamentary Bar; and, in his opinion, the clause as now drawn can, under no conceivable circumstances, operate to the prejudice of existing shareholders.

BIRMINGHAM CORPORATION GAS SUPPLY.

The Gas Department's Difficulties during the Recent Frost.

An interesting report, setting forth some of the difficulties which the Gas Department of the Birmingham Corporation had to contend with during the recent severe weather, has lately been presented; and the following particulars therefrom were given in the *Birmingham Daily Post*:—

The total cost of the repairs to frozen meters, services, and fittings, and the consequent manual labour involved in the maintenance of a continuous supply of gas, was about £500, which sum is chargeable to the Gas Department, and not to the consumers. There were only two weeks during which the frost seriously interfered with the supply. In the week ended Feb. 13, 3996 cases of frozen meters, services, or fittings were dealt with; and in the following week, by which time the frost had disappeared, the total number of cases was 3463. The largest number dealt with on any one day was 767; and that was on the 13th of February. On Sunday, the 10th, and Sunday, the 17th, every place of worship within the area of supply was visited by the department's employees for the purpose of testing the gas. Of the 311 places of worship examined, it was found that at 72 on the 10th, and 29 on the 17th, the supply was stopped by the frost; and in these cases measures were promptly taken to thaw the meters and services in time for evening service. The whole of the fitters and meter inspectors were fully engaged throughout Sunday, the 10th; and on the following Sunday, as they had been at work continuously for a fortnight, they were granted a rest—the work on that day being undertaken by a few volunteer fitters and the inspectors. The advantage of this Sunday work is obvious. Altogether 70 fitters and 32 meter inspectors were employed for the whole fortnight, at a total cost to the department, as stated above, of £500. Against this loss, the department has gained by the increased consumption of gas and the extra sales of coke.

The manufacture of gas at Windsor Street, Saltley, Adderley Street, and Swan Village during the frost was largely increased. In the week ended Jan. 31, the quantity of gas manufactured was 137 million cubic feet, as compared with 120¼ millions during the corresponding week of last year—an increase of 16¾ millions. In the following week, the output was 135¼ millions, as against 109¼ millions—an increase of 25¾ millions. In the week ended Feb. 14, the total quantity manufactured was 134¼ millions, as compared with 107 millions—an increase of 27¼ millions. The greatest weekly output of gas is usually before Christmas, when the nights are longer and business is brisk in view of the festive season; but the 137 million cubic feet of gas manufactured during the last week in January is within about 3 millions of the highest total ever before recorded. Moreover, at the three Birmingham works alone—Windsor Street, Saltley, and Adderley Street—the weekly output during the frost was greater than has ever been known before.

The effect of the severe frost in a favourable direction began to be felt on or about Jan. 10, and went on until Feb. 12. During this period, about 14,000 tons extra of coal were carbonized at the works, involving a payment of additional wages which may be roughly put at £2500. It is satisfactory to know that this money was not spent in overtime, but in the continued employment of labour which would otherwise have been thrown upon the market; the maximum of work in the Gas Department being usually reached by Christmas, after which date a gradual diminution takes place in the number of workpeople engaged. Another circumstance worth noting is that the extra coal used was taken from stock, so that there will be greater employment when the summer comes, in laying in fresh supplies, than would have been the case had not the stock been subjected to so unexpected a draught.

Owing to the stoppage of the canals, the output of coke was seriously interfered with. This disadvantage, however, was met by the increased demand for town consumption. In the manufacturing week ended Feb. 14, the sales of coke into carts amounted to 1890 tons, or an increase of 758 tons when compared with the total in the corresponding week of last year; and in the week ended Feb. 21, coke was sold into carts to the extent of 1940 tons, as against 1215 tons—or an increase of 725 tons. The total sales of coke of all kinds in the week ended Feb. 21 from the four works of the department amounted to nearly 6000 tons, notwithstanding that the supplies of some important contracts were suspended in consequence of the canal traffic being stopped by reason of the frost. This only shows the magnitude of the trade done by the Gas Department in coke, and the sudden effect of the frost on the fuel market. A good deal of the fuel was purchased by manufacturers, and even householders, who had to resort to coke because they could not get coal. The increase of 750 tons into carts in a week's output would represent probably about 1500 additional orders; and this involved a severe strain upon the resources of the department. However, additional carts and horses were procured as far as possible; and the coke was delivered with fair punctuality.

It is rather curious to learn that the patience exercised by the gas consumers was greater than that exercised by the coke consumers. The former knew of the difficulties the department had to cope with; and, as a consequence, there were very few complaints of delay on the part of the employees in attending to the meters. But the purchasers of coke were not so considerate. They did not seem to appreciate the fact that the extra pressure cast on the department interfered at all with the prompt delivery of the coke; and the result was that the officials were inundated with complaints about the want of punctuality shown in the completion of the orders.

The Whessoe Foundry Company, Limited, have been entrusted with the contract for the supply of two purifiers at the Stockton Corporation Gas-Works; and orders have been received by them for a purifier for Darlington, and a gasholder with steel tank, &c., for Pickering. Since the beginning of the year, the Danish Gas Company have placed in England some large orders for gas plant, the bulk of which—comprising a double-lift gasholder with steel tank, a set of purifiers 20 feet square, with lifting apparatus, &c.—is to be furnished by the Whessoe Company.

GAS AFFAIRS AT WEST BROMWICH.

At the Monthly Meeting of the West Bromwich Town Council last Wednesday, the Gas Committee presented a report which stated that a second bench of retorts heated upon the regenerator principle had been completed, and was at work; and the Committee had resolved to transfer the amount of £783 at present standing to the credit of the depreciation fund account to the revenue account, towards the extraordinary expenditure incurred in the construction of the retort-bench—the balance of the expenditure not provided for out of depreciation fund to be liquidated out of accumulated profits in hand. The Committee also reported the appointment as Manager of Mr. T. Glover, the Assistant Engineer and Manager of the Carlisle Gas and Water Works, at a salary of £250 per annum, with residence, coal, gas, rates, &c., free; the whole of his time to be devoted to the service of the Corporation. With reference to the finances of the department, it was announced that a loan of £80,000, obtained from the Trustees of the Greenwich Hospital, had been repaid; and the amount replaced by Corporation stock to the extent of £77,141—the balance of £2859 being provided out of the sinking fund account. The Mayor (Alderman R. Farley), in moving the adoption of the report, stated that the Committee received 60 applications for the post of Gas Manager; and very great care was taken in the final selection. Mr. Glover received his training at the St. Helens Gas-Works, where he was appointed as Sub-Manager in 1888. In 1892, he was chosen for the position of Assistant Manager at the Carlisle Corporation Gas-Works, where he had been employed since that time. He (Mr. Glover) was the holder of the honours certificate of the City and Guilds of London Institute. He would at West Bromwich have every opportunity of distinguishing himself; and he (the Mayor) felt assured he would receive all possible assistance from the Committee in his work. The report was adopted.

THE NEWARK GAS COMPANY'S PROVISIONAL ORDER.

Board of Trade Inquiry.

Last Tuesday, Major MARINDIN, on behalf of the Board of Trade, held an inquiry at Newark in reference to the application of the local Gas Company for a Provisional Order, to give them power to alter and extend their works, and to raise the necessary capital.

Mr. FRERE represented the Company; Mr. RICARD appeared in opposition for the Corporation. Mr. FORBES LANCASTER and Mr. E. H. NICHOLSON were present to watch respectively the interests of Mr. R. H. Cooper and Alderman Nicholson, the owners of neighbouring property; and Mr. G. E. KIRKLAND represented the Southwell Rural District Council.

Mr. FRERE, in opening the case for the promoters, said the Company was incorporated in 1833, and reincorporated by Act of Parliament in 1866. In 1883 the whole of the works were re-constructed; and new works were erected under the advice of Mr. T. Hawksley, which works were now in existence. Since 1883, there had been a very rapid increase in the consumption of gas. In that year, 40,113,900 cubic feet were supplied; and in 1894, 61,354,000 feet. This growth had rendered new works absolutely necessary; and it was to give the Company the requisite powers, that the present Order had been applied for. They also desired powers to extend the supply to Balderton, Barnby, Farndon, Hawton, West Newark, Winthorpe, and Kelham. They were willing to strike out Coddington, South Muskham, and Stoke. Balderton and Barnby had not consented; and they asked the Inspector to dispense with their consent. As to capital, they sought power to capitalize £2800; being the amount expended out of revenue on capital account. But as there was great objection on the part of the Corporation, and they wished to shorten the inquiry as much as possible, they struck that out. As to the additional capital, they asked for power to raise £24,000, with £6000 borrowing powers. They desired to fix the standard price of gas at 3s. 6d. per 1000 cubic feet; and he believed there was only one other instance where the standard was fixed so low. Outside the borough, the standard was to be 4s. Regarding the illuminating power of the gas, they put it at 15 candles; the testing-place to be at the works. To clause 46, which had reference to the supply of electricity, there was considerable objection; and they would therefore omit it.

Mr. *F. B. Foottit*, the Secretary of the Company, said he succeeded his father in 1889. The works erected under the advice of Mr. Hawksley produced about 40 million cubic feet of gas in 1883; and they now yielded 61¼ million feet. The present output per day was 325,000 feet, and the storage about 280,000 feet; so that the storage was very insufficient. They thought they ought to have one-and-a-half days' supply of gas in stock; for in case of an accident, they would be unable to furnish a supply of gas. The borrowing powers of the Company were exhausted; and in 1883 the expense of the works was more than the capital in hand, and they had to make up about £2000 out of the accumulated profits at that time. Further works were urgently required, and had been put off to the last moment. They had scheduled land belonging to Mr. Lamb and Mr. Cooper; and after some difficulty, they came to terms with Mr. Lamb, and purchased his. It was the most desirable plot, and would be convenient for them, forming, as it did, a compact property. They would not require Mr. Cooper's land, and had dropped it out of the Order. When the purchase of Mr. Cooper's land was first mooted, they had notice of considerable opposition; and that was one reason why they dropped it.

Mr. FORBES LANCASTER said they objected to being dropped. Their land had been scheduled, showing that, in the opinion of the Company, it would be injured; and without any reason it had been left out.

Witness said that was not so.

Mr. FRERE: Was not the reason for scheduling two plots that, if you had only put in Mr. Lamb's, you would have been entirely in his hands; and he could have charged any price he liked?

Witness: Yes. Mr. Lamb asked £1000; and we ultimately agreed for £800. Continuing, he said with regard to capital, the land (1850 square yards) and the expenses they put at £900. They estimated the

proposed new holder, to contain 400,000 cubic feet, at about £8000, including the tank. The extension of purifiers, retort-house, and coal-sheds, they placed at £2500, which was a low estimate. They wanted £1500 for mains, which in many places were in a bad state, some of them having been down 25 years. They also required £1500 for additional mains, which brought them to about £15,000. They thought a fair margin of capital for the next seven or ten years would be about £10,000 more. The Company recently adopted the principle of letting out stoves; but they could not proceed with that business as much as they wished for want of capital. He took it that the land and holder would cost about £9000, which would not enable them to make a penny more profit, but would put their business on a stronger basis. The renewal of the old mains would not earn anything, except that they would save a little in leakage. They wished to extend the supply to Winthorpe, West Newark, Kelham, Balderton, and Barnby. As to testing the gas, they adopted the mode prescribed by the Gas-Works Clauses Act, and put their illuminating power at 15 candles, which he thought was a good standard. As to price, the present maximum was 4s. 3d.; and they had charged 2s. 9d. since 1889. It used to be 3s. 11d. In 1879 it was reduced to 3s. 6d.; and in 1881, to 3s. 4d. In 1883 it was 3s. 1d.; in 1884, 2s. 11d.; and in 1889, it was reduced to the present figure—2s. 9d.—and so remained in spite of the coal strike. They were now adopting the sliding-scale; and they considered that 3s. 6d. was a fair price. If they reckoned the unremunerative capital in gasholders and land at 5 per cent., it would represent £450. A penny on the price of gas gave them £220 a year; so that, if they had their proper capital, the present price would have to be 2s. 11d. As to the charge outside the borough, they thought 4s. was fair, considering the capital that would have to be sunk, and the small amount of gas that would be consumed in the villages. With reference to Mr. Nicholson's objection, the present works were nearer than the spot where they proposed to go; and all they intended to put near Mr. Nicholson was a holder, which he would scarcely be able to see.

Cross-examined by Mr. RICARD: They had had a steady increase in the consumption of gas for ten years; and they anticipated, if they obtained these powers, it would go on increasing, but he did not think so fast. The rate of increase last year had dropped a little, and they did not expect to proceed so rapidly. In the past, they had been reducing the price of gas. The larger the output, the less in proportion would be the cost of it. There were fixed charges that remained the same whatever the output; but it was absolutely impossible to reduce the price any more. They might lower it if they had not to increase the works; but they had a large capital expenditure looming before them. With regard to finances, their reserve fund was £3048; and the present capital was £31,000. They were allowed to have a reserve of one-tenth of their nominal capital; and at present it was only £98 below that. In their profit and loss account for 1894, the balance of net profit, subject to the year's dividends, was £7090. They paid their maximum dividends last year; the accounts being less dividends paid to June 30, £2183. They brought forward £7877; and they had to pay £2183—leaving in hand £5693, which was carried to the general balance-sheet. It was more than double the maximum dividends for the year; but there was the amount spent on capital to come against that (£2000). They made no reduction in the price of gas. He was aware that, under the Gas-Works Clauses Act, they were only allowed to charge the dividends in the Act; and any surplus was to go to the reduction of the price of gas.

Mr. FRERE said there was no obligation. The Corporation might go to the Justices for an alteration.

Mr. RICARD: Do you know that you are liable at the instance of any two ratepayers to be compelled to apply that £5000 in reduction of the price?

Witness: Provided they could prove to the satisfaction of the Justices that we ought to do it. It was not all in cash; but in coke and coal.

Mr. RICARD: The application of surplus profits must be for the benefit of the consumer. When was this £5600 accumulated?

Witness: It has been accumulating for many years. If there has been £300 or £400 over the dividends, it has gone towards the current expenses.

Would it not be competent for the Company to draw on its reserve?—It would have been competent for us to have increased the price.

Have you ever, while paying your maximum dividends, drawn on the reserve?—We drew on the surplus profits.

You accumulated two reserves—the reserve you were entitled to by the Act, of 10 per cent. on your nominal capital, and a reserve fund of your own from excess of profits?—We had only £1100 in cash. The rest was in coal and coke, &c.

Witness, in answer to other questions, said the price of gas at Mansfield was 3s. 9d.; at Retford, 3s. 5d.; and at Nottingham, 2s. 3d. Lincoln also had a moderate figure. The two latter were large concerns. All of them were under the Corporations. The price at Grantham was 2s. 9d. The carriage of a ton of coal to Newark cost 4s. 5d.—or about one-third the value of the coal. He did not know whether the Corporations in the towns named were paying off the costs of purchase by annual instalments.

By Mr. FORBES LANCASTER: When the Order was deposited, they had not decided to buy either of the pieces of land scheduled. They wanted further land; and they bought the best they could get.

By Mr. KIRKLAND: The charge in the parishes was to be 4s. They had power to increase it; but it was not likely they would. They gave no guarantee on that point. There had been certain negotiations with the Corporation; but they were at an end. They did not include the villages in order to increase the price asked of the Corporation. The undertaking, if disposed of, would be sold as it was, and not as it might be.

By Mr. NICHOLSON: They had increased the plant for the manufacture of gas, and had wanted a new gasholder for years. It would accommodate the present, and also any additional output. It was intended to increase the manufacturing plant as the demand increased; but the new retorts and purifiers would be put on their old land.

Re-examined: The accumulation of profits had extended over more than ten years, and when they were charging as much as 3s. 1d. That represented working capital, and not anything in hand at the bank, except £100 or so. They were obliged to have something in hand, as they paid for their coal in advance. On June 30, 1891, the net profit was £1884, and the dividends £1864. In 1892 the profits were £2909, and the dividends £2183; in 1893, the profits were £1456, and the dividends £2183; and in 1894, the profits were £1276, and the dividends £2183. During the half year ending in December last, the profits were £1079, and the dividends £1091; showing they barely earned their dividends since they reduced the price of gas.

Mr. *George Livesey*, the Consulting Engineer to the Company, said he had recently visited the works, and thought new ones were absolutely necessary. He had seen the site selected, and considered it a most convenient one—in fact, he could see no other available. He put down the land at £900; and the gasholder and tank at £7000. But he did not think it necessary to spend all this at present. He should say £4000 would be sufficient at once, apart from any extension of the limits. They were short of storage at the present time; and it was common with a two-lift gasholder to put in one lift first and add the other when required. He put the cost of the mains at £1600, reckoning £100 per inch diameter per mile. Extending the retort-house and coal-shed, he calculated at £2500; and purification plant, at £1500. If they had an increase of 5 per cent. per annum, another £10,000 would be wanted; so that £20,000, with £5000 borrowing powers, would be a fair amount to ask. So far as the old mains were replaced by larger ones, the increase should be placed to capital; but repairs of old mains would be charged against revenue. As to the price of the gas, he thought 2s. 9d. was not sufficient to earn the dividend, which was a moderate one. The capital was very low—only £5 per ton of coal used; while in many places it was as much as £7. The charge for interest was not excessive, spread over so small a capital; and the last few years, with gas at 2s. 9d., they had not earned the dividend. In 1893 they wanted about £680 more; and if they had not had their reserves, they would have had to raise the price of gas to 3s. He asked, therefore, for a margin of 3d., putting the initial price at 3s. 3d. There were few places where the standard price was lower than 2s. 9d.; but 3s. was very moderate for large towns, in some of which it went up to 4s. 6d. At Derby, it was 3s. 6d.; and at Preston, 3s. 2d. As regarded the illuminating power in towns of the size of Newark, it was about 14 candles; and it was usually raised to 15 candles. He was surprised at the Corporation forcing up the illuminating power. A special quality of coal would be required for gas of more than 15-candle power; and the extra cost would have to be borne by the consumers. The cost of coal was 15s. 6d. per ton in 1893 and 1894; and 13s. 6d. per ton before that. In London they paid about 11s. 6d. into the retort-house. As to Messrs. Nicholson's objection, his best answer was that the works were designed by the late Mr. T. Hawksley. A suggestion to go outside Newark with the extension would be doubling the capital, and would add 1s. 6d. per 1000 feet to the cost of gas.

By Mr. NICHOLSON: The present purifiers were too small, and must be made larger. He did not think the smell from them was strong enough to kill rose bushes and shrubs, because he knew gas managers who had gardens close to the works.

By Mr. FORBES LANCASTER: The only residuals which it would pay the Company to manufacture would be sulphate of ammonia; and this was not an offensive trade. The consumers, seven or eight years ago, paid too much for their gas; but the consumers of the past few years had reaped the benefit of it. If it had not been for the balance carried over, they must have raised the price. The new gasholder would not depreciate surrounding property—at least, the landlord would not lower the rents of his houses on that account. He doubted if Mr. Cooper's land would be seriously depreciated as a building site.

Mr. *H. Midworth*, a member of the Balderton Parish Council, deposed that there was a desire among the residents, generally speaking, to have gas. A parish meeting was held at Balderton; and it was resolved that consent should not be given. The reason appeared to be that, if they gave their consent, it would make it more difficult for the Corporation of Newark to purchase the undertaking. There was one other reason given; and that was that the maximum price charged would be more than within the borough.

This concluded the promoters' case; and evidence was at once called for the opposition.

Mr. *Corbet Woodall*, examined by Mr. RICARD, said he had read the Order; and with regard to the increase of capital, he noticed it was proposed to raise £25,000. He saw no reason to cavil at that, though he thought £20,000 was ample, and would carry the Company on for another 25 years. He was strongly of opinion that £7500 should be first raised by borrowing. Extensions had been hitherto made out of the profits of the undertaking, which was unfair to consumers.

Mr. *Foottit* (interposing) said they would agree to the £20,000.

Mr. FRERE said it was exceptional to borrow before they had raised extra capital.

Mr. *Woodall* said it would be on existing capital, and rather less than one-fourth.

Major MARINDIN: You would be entitled to borrow £7500 on existing capital.

Mr. FRERE: We should borrow first of all. Then there is nothing between us.

Witness (continuing) said he had examined the accounts of the Company; and they showed a reserve fund. The Company had paid maximum dividends for a great number of years; and with the exception of 1893 and 1894, the profits had been sufficient for this purpose. As to the £5000 odd, he said it was an entirely illegitimate sum that ought never to have been accumulated. When the Act gave power to put by 10 per cent., it was a folly if it left it open to them to accumulate a further reserve. The claim that there had been special consideration to the consumers by not raising the price of gas, he did not admit. The money ought to have been used for the benefit of consumers, and not for the Company. If this Order was passed, it would be possible to divide it among the shareholders.

Mr. FRERE said, if this evidence meant anything, it was to the effect that the money accumulated should now be used up. This involved an amendment of the Order, which had not been sent in in accordance with the Board of Trade rules.

Witness said the practical application he would give to it was that the initial price asked for was altogether too high.

Mr. RICARD (in reply to the Inspector) said he was going to ask that the Order should not be passed, and that the Company should not add this £5600 to the reserve fund.

Witness said his suggestion was that the money should be carried into the undertaking of the Company like premiums on shares were carried, and bear no interest—and, in fact, form part of the new capital.

Mr. FRERE: We must have working capital.

Witness said he had never heard it suggested that working capital should be provided out of the consumers in this way. The reason they used this large balance was that they had not raised more capital. When they did raise capital, they would not want this amount.

Mr. FRERE said they were willing to transfer £4000 to capital. He admitted they had no right to divide it; and they were willing to carry it to capital account, but not to form part of the £20,000, because they must have working capital.

Witness thought the proposal a very fair one; and he would strongly advise the Corporation to assent to it.

Mr. RICARD: What about the question of price?

Mr. FRERE: It is to be 3s. 3d. in the borough, subject to the illuminating power, as we put it in the Order. If you wished for 16-candle power, we should ask for 3s. 6d.

Witness (proceeding) said, in his opinion, 3s. 3d. was 6d. too high. The initial price ought not to be more than the present charge. During a great number of years, the Company had paid the maximum dividends, and had also accumulated a sum varying from £5000 to £6000, in addition to their full reserve fund. It was clear, therefore, that 2s. 9d. or 2s. 10d. was sufficient to cover the maximum dividends. It was trifling with the sliding-scale, and bringing a good system into disrepute, to try to use it in this one-sided manner.

Major MARINDIN: You are treating the accumulation as if it had all been obtained at the 2s. 9d. price.

Witness did not think that affected the question at all. As the Company had grown, they had found the cost of manufacture diminish; and so from time to time they had reduced the price. It was 3s. 6d. in 1879, 2s. 9d. in 1889, and what it would be in 1899 he did not know. In the two years in which the Company did not earn their full dividend the circumstances were exceptional; and the sliding-scale ought not to be based on years affected by such circumstances. As to illuminating power, the Company's returns showed that it had been 17 candles; so that in asking for 16 candles, they were not requiring that it should be increased.

Cross-examined by Mr. FRERE: He knew of the negotiations with the Corporation. They did not ask for a reduction in the standard price of gas because they thought it would affect the amount which the Company would take for their works. He did not know of any case where 2s. 9d. had been adopted as the standard price under the sliding-scale. Each case should stand on its merits. The Company could have reduced the price below 2s. 9d. In 1889, they put by £600 after paying all dividends; in 1890, £658; in 1891, £21; in 1892, £716. So that since 1889 they had accumulated £2045 at the 2s. 9d. price. In 1893, they drew from it £727; and in 1894, they also lost £907.

Major MARINDIN: So it appears that all the accumulation was made before 1889, except £400. That is the only accumulation since the alteration in price to 2s. 9d.

Witness: The last two years were quite exceptional. In four years out of the six, the Company had a large balance over. Having regard to the probable increase in the consumption of gas, he was sure there would be a margin of profit after the maximum dividend had been paid on the 2s. 9d. scale.

Mr. *W. Doubleday*, the Mayor of Newark, deposed to negotiations with the Company during the past month on the part of the Corporation. In the interests of the consumers, they were desirous of purchasing the undertaking; and they wished that provision should be made in the Order to enable them to do so.

Mr. FRERE said he had no notice of the nature of the clause Mr. Ricard wished to have inserted in the Order.

Major MARINDIN said he had known clauses agreed upon and inserted afterwards. He should like to know what the Corporation wanted.

Mr. FRERE: Is it to be compulsory or not?

Mr. RICARD: Compulsory, only on fair terms as to price.

Mr. FRERE contended that in no case had a compulsory purchase clause been inserted in a Gas Provisional Order against the wishes of the Company. Water was different, as it was a necessity of life.

Major MARINDIN said no clause would, of course, be put in without both sides having full opportunity of considering it.

Mr. RICARD remarked that the Corporation wished to ask the Board of Trade to put in a clause; but he would not carry it farther than that.

Major MARINDIN: How far did the negotiations go?

Witness: It was a question of price. We adopted the suggestions of Mr. Woodall. The Company were prepared to sell at a certain price, and would not recede from it.

Mr. *Foottit:* We were unwilling sellers; but we fixed a price, and the Corporation would not give it.

Mr. RICARD then addressed the Court, urging that 2s. 9d. should be inserted as the standard price, and not 3s. 3d. or 3s. 6d.

Mr. *Foottit* said they would be content with half-an-hour's notice of testing the gas at the works.

Mr. RICARD said they would accept that, except in regard to pressure. With reference to the transfer of the concern to the Corporation, he would ask that a clause be inserted giving the Corporation the option of purchase within two or three years of the passing of the Act confirming the Order, on terms to be agreed upon, or failing agreement, to be submitted to arbitration.

Mr. FORBES LANCASTER, addressing the Court on behalf of Mr. Cooper, urged that the Company were proposing to treat his client very shabbily. If the gasholder was built where proposed, the value of his land, as building land, would be obliterated.

Mr. *W. R. Chester* was called by Mr. LANCASTER, and deposed that a gasholder of 100 feet diameter could be erected with two lifts of 25 to 35 feet each; and to those they could add further lifts up to 100 to 150 feet.

Mr. FRERE: We are willing to limit it to two lifts.

Witness: That would destroy the value of the land for building purposes. He thought it unfair that the Company should have power to do an injury to an owner without compensation. The small holders there before were only 14 feet high; while the shadow of this large one would cover two-thirds of the land.

Mr. E. H. NICHOLSON said he had been able to come to an arrangement with the promoters. The agreement, on his withdrawing his opposition, was as follows: The Company agree: (1) Not to use the new land purchased from Mr. Lamb for the manufacture or purification of gas or any residual products, nor for the storage of any offensive materials. (2) To close the grids of the liquor and tar tanks, make the manlids air-tight, and put in a ventilating-pipe. (3) To make arrangements to ventilate the lime purifiers when they are altered and enlarged, by using an exhauster to blow air through them before changing; and thus deodorizing the spent purifying material before exposing it to the air.

Major MARINDIN: Mr. Nicholson is satisfied, the County Council are satisfied, and the Corporation are satisfied on certain points.

Mr. RICARD: We are satisfied with the capital, but not with the standard price of gas. Moreover, we ask you to insert a clause giving powers as to purchase.

Mr. FRERE: I am not going to bring up any clause with regard to purchase.

The Inspector then visited the works; and on his return, Mr. Frere having briefly addressed him, he said his report would be made to the Board of Trade in due course.

ELECTRIC LIGHTING NOTES.

The Birmingham City Council were occupied some time last Tuesday in considering recommendations that certain considerable sums should be expended in fitting up the new Technical Schools in the city. One item was £6080 required for providing electric light fittings and motive power. In moving that the Committee having this matter in hand should be authorized to expend the amount named, Mr. Martineau stated that the lighting of the building by incandescent gas-lights could be done at a little lower price; but the Committee recommended the adoption of electricity because it would be more convenient, and the installation of the electrical plant on their own premises would be one of the best possible means for practical education in the science of electricity. The allusion to the incandescent light drew from Alderman Pollack an interesting comparison. He said that the cost of lighting the building by the incandescent gas-burner was estimated at £1383; whereas the expenditure for installing the electric light only was shown to be £4425—the first sum being payable in thirty years, and that for the electric light in ten years. Reducing the redemption in each case to ten years, they had this result—that the annual cost of lighting by electricity was £1022, and by the incandescent gas-light £738. The latter estimate would, however, be reduced by at least £130 as the Incandescent Gas-Light Company had taken 30 per cent. off the price. But the cost of gas supplied to the incandescent lamps would be £282; and the cost of the gas necessary for the motive power to produce electricity for lighting only would be £200. So that he humorously remarked, as Chairman of the Gas Committee, he did not think it his duty to oppose the motion. An amendment was then moved by Mr. Bradley, instructing the Committee to accept the lowest tender for electric lighting submitted on the specification originally issued to a selected number of firms; and this was carried by 30 to 28. It was thereupon intimated that the Technical School Committee would resign; and the result of this announcement was that the amendment, on being put as a substantive resolution, was lost by 34 to 32—the question being thus left for the present undecided.

The negotiations between the Special Lighting Committee of the Liverpool City Council and the Electric Lighting Company have reached an important stage; the latter body having communicated to the former the terms they are prepared to accept from the Corporation for their undertaking. A meeting of the Lighting Committee was held last Tuesday to consider the matter; but the members present were pledged not to disclose the result of the proceedings.

Major-General Crozier, R.E., at a recent inquiry at Kingston-on-Thames, had occasion to severely reprove those who have directed the construction of the Corporation electric lighting works, for allowing the expenditure to exceed by £2550 the amount originally sanctioned. To cover this outlay and proposed extensions, the Corporation now asked for a further £10,000, which will make, with the first loan, £26,000. The Consulting Engineer (Mr. A. H. Preece) was examined at great length as to the excess of expenditure, after which the Inspector said much of the money might have been saved if more care and thought had been bestowed upon the original plans. He should not like to build a house on the same principle. The bulk of the items were for cutting away work that had been previously put in; there was scarcely anything among the extras that might not have been avoided. Unfortunately architects never made adequate estimates; and he was afraid electrical engineers were rather too fond of taking a roseate view of the probable cost. If they had started with a good round estimate, all this would have been avoided. These inquiries were of a most unpleasant character—unpleasant to him, to the Local Government Board, and to all who had to do with them—and it arose entirely from having an inadequate estimate. It did not save money in the end—in fact, he thought it was always the other way, as it generally entailed more expense. In reply to the Inspector, Mr. Preece stated that the original plant was estimated to be equal to the demands of 5000 lamps fixed. That estimate had proved to be too sanguine; because with only 3900 lamps connected, they were running at their full load. They calculated that, with 5000 lamps fixed, they would never have more than half the number burning simultaneously; but here the customers were chiefly shopkeepers, and all the lights were going together. It was now proposed to increase the capacity to 5000 lamps burning at one time, or 8000 lamps fixed. The undertaking was not paying at present; but it was hoped that when the 8000 lamps were fixed, it would pay. The Inspector: But will it pay; can you say yes or no? Mr. Preece: I

see no reason why it should not pay when we have 8000 lamps fixed. At the close of the inquiry, the Inspector visited the works.

The Monmouth Town Council have adopted plans (subject to the approval of the Local Government Board) for a combined scheme of drainage and electric lighting, the cost of which is estimated at £22,000.

The recent fatality in connection with the electric light undertaking of the Bristol Corporation, recorded in the JOURNAL last week (p. 499), formed the subject of an inquiry by Major Cardew on Tuesday. Mr. W. J. R. Wilcocks, an improver at the works, gave evidence. He said the deceased was dusting the fuse-board, which intervenes between the mains and the transformer. He was wearing an india-rubber glove on his right hand, and started working with that hand. Presently he put his left hand to the duster, and, inserting the duster in the slot into which the fuse-end fitted, pulled it backwards and forwards. He looked up as if to speak to witness, and touched one terminal with his bare knuckles. There was a "scizzling" noise, the deceased uttered a cry, and was drawn rigidly upon his toes, so that he leaned against the fuse-board, but did not clutch it. Wilcocks pulled him back, tried artificial respiration, and went for a doctor. The knuckles of three fingers on the left hand were scorched, and split to the bone. William Coleman, brother of the deceased, said Robert Coleman was an experienced workman. He knew the danger of touching high-tension conductors. In reply to Major Cardew, it was stated that the deceased was wearing ordinary boots; and Wilcocks said he was confident he only touched one terminal. Major Cardew said he would visit the transforming-room, and see what were the arrangements, and this he proceeded to do. The fuse-board is supported horizontally on a pedestal of red bricks, from which it is oil-insulated. Four bare terminals stand out vertically a couple of inches above the board; and the slotted ends of each pair are connected by fuses carried on a porcelain bridge, which serves as an insulated handle for the removal of the fuses. The floor of the cellar is uninsulated, and is formed of cement about as dry as a cement floor in a cellar usually is. Major Cardew called attention to the fact that there was abundance of room, and asked if a second fuse-board could not be fixed, so as to have no current passing over the one being cleaned. He added that he should not care to work with one glove in the place. He suggested that india-rubber boots would be an additional precaution. The terminals and adjustments were very exposed; and he recommended that they should have placed around them a guard of vulcanite, substantially made, but shaped so as not to interfere with the dusting of the fuse-board. He would also have the terminals and metal adjustment painted red. Mr. Faraday Proctor, the Chief Electrician to the Corporation, made a note of these recommendations; and Major Cardew added a suggestion that the floor should be covered with asphalte, and the pedestal supporting the fuse-board should be of glazed bricks, or else enamelled with non-conducting material.

The Islington Vestry, at a recent meeting, unanimously passed the following resolution on a report from the Electric Lighting Committee: "That, having considered a report from the Electrical Engineer, calling attention to the fact that electric lighting enterprise is being prejudiced by the explosions of gas occurring from time to time in electrical conduits, and to the possible danger to life resulting from such explosions, it recommends that a memorial be presented to the Board of Trade, urging that steps should be taken, by legislation or otherwise, to obtain greater control over the Gas Companies as regards any escape of gas from their mains; and that a copy of such memorial be forwarded to the other Metropolitan Vestries and District Boards, and to the several Metropolitan electric lighting authorities, with a request that they will make similar representations."

The question of "extras" for the construction of the electric lighting works at Worcester evoked, at last Tuesday's meeting of the City Council, some unpleasant remarks for those primarily responsible. The extras amount to about £5000; and the Electric Lighting Committee reported that they were advised the Council would have to pay the money, as the City Engineer had certified that the work was done, and its value had been assessed by a Quantity Surveyor. The report strongly complained that the Committee were not informed of the large extras for which they were being made responsible by their officers. A reply circulated by the City Engineer pointed out that by the wording of the specification power was given to him to order any extra work, that many extras were ordered in the time of the late Engineer, and that as his certificate and that of the Quantity Surveyor were in the nature of an award, it would not have been right or regular to have informed either of the contracting parties before the certificates were signed which bound both. Mr. Williamson, in moving the adoption of the Committee's report, said one thing that struck anyone who inquired into the circumstances was the systematic way in which estimates had been wrong from the commencement. The highest amount ever estimated in the Surveyor's department for the electricity works at Powick was £10,065; but the lowest tender obtained was £14,780. He did not see how any reasonable man could throw the blame for the extras on the Contractor or on the Quantity Surveyor. It must fall on the Surveyor, who did not seem to have appreciated his position, but had acted with lack of judgment. Mr. Millington, in seconding the motion, said they had been relying on "broken reeds" in the Surveyor's department. The estimates had gone up from £30,000 to £60,000; and he asked if a servant who so under-estimated work could be relied on? He did not care whether the burden of this remark fell on the present Surveyor or his predecessor. It appeared to him that nobody had looked after the interests of the Corporation. The Sheriff (Mr. J. B. Matthews) then raised the question whether the Council were liable to pay the amounts, in the absence of the written instructions of the Surveyor to the Contractor, which appeared by the specification. On this point, the report was referred back to the Committee.

Under the advice of Messrs. Bramwell and Harris, the Electric Lighting Committee of the Derby Town Council are contemplating the expenditure of an additional £5000 on their works. Of the £35,000 which has been granted by the Council, the Committee have actually spent £34,000, and have incurred liabilities amounting to £43,000; being £8000 in excess of the total sanctioned by the Council. The extra outlay is attributed by the Committee in large measure to the rapid and unexpected rate at which the public had taken the light. At the meeting of the Council last Wednesday, the Committee asked that the expenditure of the £8000 and of the proposed £5000 be approved. Several members severely criticized the operations of the Committee, contending that the installation was not successful, and complaining that a balance-sheet had not been published. Alderman Marsden stated that in January an estimate was made; and it was found that there was a balance in hand equal to 5½ per cent. for interest on the outlay and the sinking fund. Eventually the recommendation was adopted on certain conditions.

The application of the Bath Electric Lighting Company to the Board of Trade for a Provisional Order, and the rival application of the Corporation, were inquired into by Major Cardew last Wednesday. The electric light, it was stated, was introduced into Bath by Mr. Massingham in 1890, who had a Licence, which would expire at the end of 1897. In 1891 Mr. Massingham transferred the business to the Company which now sought the Order, with power to light the whole city instead of a restricted area. It was declared, on behalf of the Company, that £40,000 had been spent on the undertaking, and that £15,000 would provide for the contemplated development. Sir Frederick Bramwell was examined as to the suitability of the town weirs and the destructor for generating electricity, as the Corporation contemplate using them; and he gave it as his opinion that they were valueless. For the Corporation, it was stated that they were dissatisfied with the Company's supply, and wished to have the control of the light in their own hands.

Alderman Lowe had not a very encouraging statement to lay before the Burton-upon-Trent Town Council last Wednesday, in regard to the electric light undertaking, when moving the adoption of the minutes of the Gas Committee. He stated that the Committee had received from the Borough Accountant a balance-sheet concerning the electric lighting during the past year. It was anticipated—at least provision was made in the rate for it—that there would probably be a loss of £2250. Of course, they were all sorry to contemplate so great a loss as that; but he was glad to say it was much less—the actual figures being £1802. They were therefore better off by £450 than they anticipated twelve months ago. The working expenses for the year were £843 in round figures; while the receipts for electric lighting were £528. The actual loss on the working was consequently £315. He had no doubt whatever that, if they obtained as many customers as they were able to supply with the electric light, there would be no loss on the general trade. What made the great difference was the repayment of the principal and the interest on the loan; and he was afraid that for some time to come, unless some cheaper way could be devised for producing the electric light, they might not be able to meet the dividend and redemption fund, though they might be able to pay the working expenses.

METROPOLIS WATER SUPPLY.

The Quality of the Water during the Month of January.

The returns furnished to the Registrar-General by the London Water Companies as to the water supply of the Metropolis during January, show that the average daily supply amounted to 196,989,975 gallons, as compared with 202,442,984 gallons in the corresponding month of 1894. The number of services being 812,595, the rate was 242 gallons to each service. Of the entire bulk of water sent out, 99,695,849 gallons were drawn from the Thames, and 97,294,126 gallons from the Lea and other sources. Reporting upon the quality of the supply, Dr. E. Frankland said: Taking the average amount of organic impurity in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies and by the Tottenham Local Board of Health was: Kent, 0·7; Tottenham, 1·3; East London (deep well), 1·8; Colne Valley, 1·9; New River, 2·3; Grand Junction, 3·8; Southwark and Lambeth, 3·9; West Middlesex, 4·1; Chelsea and East London (river supply), 4·4. The unfiltered river waters contained the following proportions: Thames at Hampton, 4·1; New River Cut, 1·9; and the Lea at Angel Road, 4. The Thames at Hampton was, on Jan. 4, turbid and pale yellow in colour, and of fairly good chemical quality. Bacterially, however, it was of very inferior quality, and much worse on the 21st of January, when a second sample was taken. As delivered by the five Companies drawing from this river, it was in every case efficiently filtered, and of good chemical quality. The bacterial improvement effected by the various Companies is expressed by the following percentage numbers: Chelsea, 99·54; West Middlesex, 99·20; Southwark, (No. 4 filter well) 92·52, (No. 8 filter well) 98·84; Grand Junction, (general well at Hampton) 98·53, (general well at Kew) 99·71, (Kew south well) 99·73; and Lambeth, 97·53. The New River Cut, before entering the subsidence and storage reservoirs, was, on Jan. 7, turbid and of a very pale yellow colour. It possessed a high degree of organic purity, but was bacterially of very inferior quality. It was, however, in this respect considerably improved by storage before filtration. After treatment, the New River Company delivered it in a clear and bright condition, and improved it bacterially to the extent represented by the following percentage numbers: General filter well, 89·78; No. 2 filter well, 97·87; and No. 8 filter-well, 91·09. The water abstracted from the Lea at Angel Road by the East London Company was pale yellow and turbid. It was of almost exactly the same chemical quality as the Thames at Hampton; but much inferior in bacterial quality. It was efficiently filtered before delivery; but was then somewhat inferior in respect of organic purity to the raw river water passing the intake on that day. The bacterial improvement is expressed by the following percentage numbers: No. 1 Essex well, 98·88; No. 2 Essex well, 99·16; Middlesex well, 99·09; No. 11 filter, 99·15; and No. 12 filter, 99·35. The deep-well waters of the Kent, East London, and Colne Valley Companies, and of the Tottenham Local Board of Health, possessed a high degree of organic purity, and were of excellent quality for dietetic purposes. All these waters, with the exception of the Tottenham, were clear and bright without filtration; and the Colne Valley Company's water

was softened before delivery, and thus rendered suitable for washing. The Tottenham Company's supply was very slightly turbid. Seen through a stratum 2 feet deep, the Kent, Colne Valley, and East London (deep-well) waters were clear and colourless; the Tottenham, colourless and very slightly turbid; the New River, clear and very pale yellow; and the remaining waters, clear and pale yellow. The bacterioscopic examination of the raw river water before and after storage, and of the supplies of the various Companies collected on the 4th, 5th, 7th, 8th, 21st, and 22nd of January, gave the results contained in the following table:—

Description.	No. of Microbes per Cubic Centimetre.		Temperature in Deg. C.
Raw and Stored River Waters.			
Thames at Hampton, Jan. 4	16,520	..	1·5
" " Jan. 21	50,040	..	4·6
" after storage for 14·7 days (Chelsea Company)	780	..	2·5
New River Cut before entering reservoirs, Jan. 7	6,400	..	3·3
" " after storage before filtration, Jan. 7	4,680	..	1·3
" " after storage before filtration, Jan. 22	10,520	..	3·7
East London Company's intake at Angel Road, Jan. 7	23,400	..	1·8
East London Company's intake at Lea Bridge, Jan. 7	5,540	..	1·4
East London Company's intake at Lea Bridge, Jan. 22	3,980	..	1·7
Filtered River Water as Supplied.			
Thames—			
Chelsea, general filter well, Jan. 4	76	..	2·3
West Middlesex, general filter well, Jan. 5	132	..	2·0
" " " " Jan. 21.	61	..	3·7
Southwark, No. 4 filter well, Jan. 4	1,236	..	2·5
" " " Jan. 21	560	..	4·8
" No. 8 filter well, Jan. 4	192	..	1·4
" " " Jan. 21	190	..	4·3
Grand Junction, general well at Hampton, Jan. 4	176	..	1·5
Grand Junction, general well at Hampton, Jan. 21	894	..	4·3
Grand Junction, general well at Kew Bridge, Jan. 5	48	..	3·5
Grand Junction, south well at Kew Bridge, Jan. 5	44	..	3·7
Lambeth, general well, Jan. 4	408	..	2·5
Lea—			
New River, general well, Jan. 7	654	..	1·5
" " " Jan. 22.	208	..	3·3
" No. 2 filter well, Jan. 7	136	..	1·4
" No. 8 " Jan. 7	570	..	1·1
" No. 1 " Jan. 22	70	..	3·3
" No. 7 " Jan. 22	52	..	3·4
East London, No. 1 Essex well, Jan. 7	262	..	1·2
" " " Jan. 22	2,240	..	1·9
" No. 2 " Jan. 7	198	..	1·4
" " " Jan. 22.	5,120	..	2·3
" Middlesex well, Jan. 7	214	..	1·3
" " " Jan. 22	2,052	..	2·4
" No. 11 bed, Jan. 7	200	..	1·4
" No. 12 bed, Jan. 7	152	..	1·3
Deep well—			
Kent, new well at Deptford, Jan. 8	7	..	11·3

Notwithstanding that the numbers in the above table yielded by the filtered river waters exhibit an enormous reduction, when they are compared with the numbers obtained by the cultivation of the raw river waters, the results are still far from satisfactory, and quite without precedent during the time these bacterioscopic observations have been made. On the 5th of January, the filters of the Chelsea and Grand Junction (Kew Bridge) Companies were alone yielding water of satisfactory bacterial quality; while some of the filters of the remaining Companies drawing from rivers were yielding on the 4th, 5th, and 7th of January numbers of microbes per cubic centimetre much in excess of those almost invariably found in the water from the same filters. This abnormal bacterial quality in the filtered waters led me to have a second series of samples taken on the 21st and 22nd of January; and the cultivation of these samples upon gelatine peptone plates yielded in some cases better, in others worse, results than those obtained from the samples collected on the earlier dates. Thus the water of the general filter well of the West Middlesex Company, which contained 132 microbes per cubic centimetre on the 5th of January, contained only 61 on the 21st; while the water from the New River Company's general well, which contained 654 microbes per cubic centimetre on the 7th, contained only 208 on the 22nd of January. On the other hand, the Grand Junction Company's water, taken from the general well at Hampton on the 4th of January, contained only 176 microbes per cubic centimetre; but on the 21st, 894 per cubic centimetre. Again, the water from the East London Company's No. 1 Essex well, which contained 262 microbes per cubic centimetre on the 7th inst., was found to contain nearly 10 times this number per cubic centimetre on the 22nd; and the water of No. 2 Essex well, which contained only 198 microbes per cubic centimetre on the 7th of January, contained no less than 5120 on the 22nd—a number which considerably exceeds that contained in the unfiltered water on the same day. There can be no doubt that these abnormal results are due entirely to the prevalence of cold weather, and not to any defects in the filtration plant. Nothing of an injurious character was found among these microbes. They were ordinary river microbes, which, in a state of suspended animation, owing to the low temperature, were unable to attach themselves to the particles of sand on the surface of the filter, and were carried along by the water through the interstices.

In their report to the Official Water Examiner (Major-General A. de Courcy Scott, R.E.) on the composition and quality of the water supplied to London during January, as ascertained by tests of samples taken daily on behalf of the Companies, Professors Crookes and Dewar say: In all respects the chemical composition of the five Thames-derived waters in January is a little better than that of the corresponding samples for December. The effects of the floods have passed away; and although the severe frosts have checked aquatic vegetation, and thus tended to diminish the oxidation of organic matter through the influence of plant life, this diminution is not perceptible—the organic matter being a trifle less than it was previously. In spite of the difficulties of filtration when the surfaces of the filter-beds are liable to be frozen, only three samples [out of 161] were recorded as "clear, but dull," the whole of the other samples being clear, bright, and well filtered. The rainfall over the Thames Valley has been slightly in excess of the 25 years' average, which is 2·26 inches. The actual rainfall has been 2·60 inches; showing an excess of 0·34 inch.

SOUTHAMPTON CORPORATION WATER DEPARTMENT.

Annual Report of the Engineer.

At the Meeting of the County Council of the County Borough of Southampton last Wednesday week—the Mayor (Mr. L. Button, J.P.) presiding—the Works Committee submitted the annual report of the Water Engineer (Mr. W. Matthews), accompanying it with an expression of entire satisfaction with the able manner in which the works had been carried on by that gentleman during the past year.

Mr. J. Lemon, in prosposing the adoption of the report, characterized it as a very admirable one. The consumption of water for domestic purposes was about 63 million gallons less than in the previous year, and for trade consumption 37 million gallons more. This showed that the Engineer had succeeded in reducing the waste of water to the extent of 63 million gallons, and also that the water so saved had been sold for trade purposes to the extent of 37 million gallons more than the previous year, which represented nothing less than £925 at 6d. per 1000 gallons. The water sold by meter in 1894 was 203,825,000 gallons; while in 1890 it was only 97,202,000 gallons—showing that in four years the water sold by meter had more than doubled. The increase was 106,000,000 gallons; and working this out at 6d. per 1000 gallons gave £2650. The cost of pumping was a trifle higher than last year, due to the extra cost of coal, which had been 3s. 4½d. per ton more than in 1893; but the total increase was only slightly more than in 1893. The new services laid by owners were rapidly increasing. As to waste inspection and house fittings, this was a very important item. The number of house inspections was 50,550; and the number of taps dealt with temporarily by the inspector, 1687. Notices were served on 9470 owners to abate waste. This showed that every possible means were taken by the Engineer and his department to reduce the waste. The Engineer, referring to this subject in his report, said: "There is still plenty of room for further improvement; and should the Corporation have occasion to go to Parliament again, I should strongly advise them to acquire greater and more modern powers as to their control over house fittings, waste, and the employment of none but properly qualified men. All fittings should be tested and stamped by our officials; and I would suggest that this principle be adopted at once." There was a good deal to be said in favour of this, as notwithstanding the amount of supervision exercised by the water inspectors, there was still waste. He (Mr. Lemon) might here say a word in favour of Mr. Matthews in reference to the cost of management, which they would find was 0·218d. per 1000 gallons. This was a result which would compare favourably with the management of any water-works in the kingdom that he knew of. The consumption of water had now been brought down to the low estimate of 28 gallons per head per day, and the water sold by meter had considerably increased, showing that in this undertaking they had a valuable property, and well worth £200,000.

Colonel Bance seconded the adoption of the report, which, he said, showed that the balance of the debt, irrespective of spending a large sum, had been reduced from £126,000 to £124,000. The works were yielding 4 million gallons a day, which was extremely satisfactory.

The report was adopted.

ST. PETERSBURG NEW WATER-WORKS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the Cannon Street Hotel—Mr. W. T. Western in the chair.

The Directors' report for the year ending Dec. 31 last stated that, after providing for the interest upon the debenture debt, and for the necessary sinking fund, the net profits of the Company were £4891, whereof £1000 was paid to Mr. Western, as directed by the last general meeting. The proposal brought before that meeting for reducing the nominal capital of the Company to a sum equal to the assets not having been carried by the requisite majority, the profits of the year were not available for the payment of a dividend; and they had been used, together with the sinking fund, towards the redemption of the debenture debt. By this means, £10,175 of debentures had been paid off during the year; and notice had been issued for redeeming a further amount of £5000 in April next. The Directors had been requested by certain shareholders to again bring forward the question of reducing the nominal capital of the Company to a sum equal to the present value of the assets, in order that the surplus of revenue remaining over, after providing for interest and sinking fund on the debenture debt, and sinking fund for redemption of the share capital, might be available for dividends. The effect of the vote of the last extraordinary general meeting was to compel the application of all the income of the Company, after providing for current interest and expenses, to the redemption of the debenture debt, excluding the possibility of any dividend to the shareholders for some years to come—certainly until the whole debt was redeemed. The present net debt, allowing for bonds under notice of redemption, was about £95,000; and the income which, under present arrangements, was being applied to the redemption of debt was about £10,000 a year—more or less, according to the rate of exchange. The sinking fund necessary to redeem the whole of the debt, and to repay the share capital at the end of the term of the annuity, at the rate of £13 a share (calculating the sinking fund at 5 per cent. interest—the same rate at which the Municipality

could redeem the annuity), was at the present time about £5500 a year; and any surplus of net revenue over this amount and the yearly interest on the debenture debt would, if the nominal capital be reduced, be available for dividends.

The CHAIRMAN, in moving the adoption of the report, said the Company had received the annuity from the Municipality of St. Petersburg with commendable punctuality. The rate of exchange at which they had brought the money home had been comparatively a very favourable one—that was, favourable to what they had known in past years. It would be seen that the Directors had carried out their intention of reducing the establishment charges to a minimum. It would probably be remembered that, at the last annual general meeting, a proposal was put before the shareholders for dealing with the rearrangement of the capital. That was not adopted; and the effect was that the whole of the surplus receipts of the Company, after providing for interest and expenses, had been applied in reducing the debenture debt. By that means, the sum of £10,000 had been paid off during the year. As to the other side of the accounts, one year had run off the time for which the Company held the annuity. The net result of the year's transactions was that they were £5000 to the good upon the year's operations. The Municipality of St. Petersburg had taken no steps so far as the Company were concerned with regard to redeeming the annuities. They had talked the matter over among themselves; but the Directors had heard nothing from them officially.

Mr. R. S. GUINNESS seconded the motion.

Mr. ROBINSON said he saw the Directors pointed to the impossibility of dividing the surplus profits because the capital had not been reduced. He should like to know what was the legal impediment.

The SOLICITOR stated that the best legal opinion had been taken on the point; and the answer to the question was simply this: The Company had at the debit of profit and loss a sum of £70,691; and it had been held that, until that debit balance was got rid of, there was no profit from which dividend could be paid.

The motion was carried.

On the proposition of Mr. GUINNESS, seconded by Lord CHURCHILL, the retiring Directors (Messrs. Western and Darley) were re-elected; and Messrs. Cooper Bros. and Co. were re-appointed Auditors.

The meeting was then resolved into one of holders of "B" debenture stock, for the purpose of approving of special resolutions to be proposed at a subsequent extraordinary general meeting.

The CHAIRMAN, in moving that the resolutions be approved, explained that the proposals were of a similar kind to those which were placed before the last meeting, and which the "B" shareholders then unanimously passed. The only difference was that, whereas last year the Directors wished to reduce the shares down to £12 10s., it was now only proposed to reduce them to £13; the reason being that the Company had saved money to nearly the difference between the two amounts.

The motion was agreed to.

An Extraordinary General Meeting was then held, at which the following resolutions were discussed at great length: (1) "That the capital of the Company be reduced from £200,000, divided into 10,000 shares of £20 each, to £130,000, divided into 10,000 shares of £13 each, and that such reduction be effected by cancelling capital which has been lost, or is unrepresented by available assets, to the extent of £7 per share upon each of the 10,000 shares which have been issued, and are now outstanding, and by reducing the nominal amount of all the shares in the Company's capital from £20 to £13 per share." (2) "That the Articles of Association be altered by inserting the following Article after 112—viz., '112A. The Directors may also pay dividends half yearly out of any periodical payments received from the Municipality of St. Petersburg so far as they may be applicable for distribution as net profits.'" It was announced by the Chairman that the holders of some 3000 shares had sent in proxies to be used in favour of the alteration, as compared with the holders of 90 shares in opposition.

Sales of Shares.—On the 27th ult., Messrs. Lancaster and Sons, of Barnsley, sold £155 of consolidated "A" stock of the *Elsecar, Wentworth, and Hoyland Gas Company* for £131; and some £10 shares (£8 paid) in the same Company for £9 10s. each. A few £2 10s. shares in the *Worsbro' Dale Gas Company* changed hands at an advance of 3s. per share. On the same occasion, the following stock of the *Barnsley Gas Company* was disposed of: Ten £10 "C" shares, paying 6 per cent., at £15 15s. each; four £10 "D" shares and some "E" shares, paying 7 per cent., also at £15 15s. each; two £10 "F" shares (8 per cent.), at £18 each; and three £10 "G" shares, £6 paid, paying 7 per cent., at £11 5s. per share.——At the Mart, Tokenhouse Yard, last Wednesday, Messrs. Fox and Bousfield sold £50 second debentures of the *Cape Town and District Gas Company* at £52.——Last Friday, 10 fully-paid original shares in the *Gravesend and Milton Gas Company* realized £955.

Wages at the Bolton Corporation Gas-Works.—For some time past, an agitation has been on foot by the Bolton Gas Workers' Association, on behalf of the men at the gas-works of the Bolton Corporation, for an alteration in the terms of their employment. The men wished Sunday labour to be abolished, if practicable; and failing this, the pay to be for double time on that day. The matter has lately been under the consideration of the Gas Committee; and at their meeting on the 1st inst., they declined to grant the application for double time, but made the following proposal to the Association: That all men employed at the gas-works on Sundays should be paid time-and-a-half for the three shifts on that day, instead of only being paid time-and-a-half for two shifts, as at present; this concession to be conditional upon the quantity of coal at present carbonized by each shift on Sundays and other days being increased from 3 tons 8 cwt. to 3 tons 12 cwt. This proposal will have to be submitted to a meeting of the Association; and, in the event of the terms being accepted, the time-and-a-half is to commence forthwith, and the rule as to increased carbonization is to come into operation and continue on and from the 1st of August next. At the same meeting, the Committee had before them applications from the coal and coke wheelers for an advance of wages from 4s. 6d. to 5s. per day, and one from the labourers for an addition of 2s. per week; but these applications were not acceded to.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

While I write, it is raining heavily, and the barometer is falling in face of a north-easterly breeze; so that it may be taken for granted that the great frost-siege of this winter has at last been raised. Its effects are far from having passed. There are still houses without water in many towns; and water is being served out of stand-pipes as it has been for the past six weeks. A reliable authority—a grave-digger—informed me on Thursday that while the frost had penetrated about three feet into the ground, the thaw had then only got down about four inches. That is rather slow progress, and points to a considerable time elapsing before all the frozen water-pipes are got to flow again. The question has been raised in more places than one as to the best means to be adopted for preventing the freezing of pipes. Of course, all are agreed that depth is the most effective means; but in the case of service-pipes, they must come to the surface. On that subject, the opinion of Mr. R. T. Omond, the Superintendent of the observatory on the top of Ben Nevis, who has had exceptional opportunities for studying it, is of value. He writes: "The general accounts over Scotland of the depth to which the frost penetrated show, that in compact soil—such as under a road or street—it was felt to a depth of about three feet; but in loose dry ground, only from one to two feet. This is what might be expected; a wet soil is a better conductor of heat—or cold—than a dry; and the looser the texture of the ground, the more air it contains—that is, it is more like a blanket, the warmth of which is due not to the wool fibres themselves so much as to the air they keep entangled among them. Under a public road is about the very worst place one could put water-pipes, as regards injury from frost; and anything needing protection, like plant roots in a garden, potatoes in a pit, &c., should be covered with as loose and porous a material as possible." Mr. Omond's theory would seem to be right, because otherwise the openings for the stand-pipes which have been so largely used of late, and which are merely filled with straw and closed with an iron cover, would have allowed the pipes under them to get frozen.

The Dumfries Water Commissioners have had what, to me, looks like a strange method of keeping the frost out of these openings, which was to put paraffin oil and straw into them. It was mentioned at a meeting of the Commission this week that the result had been that the oil had got into the water, and had made some people sick who consumed it. It is known that paraffin oil does not freeze till a temperature only a few degrees above zero is reached; and on that account it is quite a likely substance for keeping frost out of water-pipes. But then its insidious nature must have been forgotten by the Commissioners. There is scarcely anything it will not penetrate; and when this is taken into account, and its nauseous properties, it is a most unsuitable means to employ. It was explained that the stand-pipes were not expected to be required for the furnishing of domestic supplies. The stoppage of the water-pipe on the Tay Bridge, by which Newport and Tayport are supplied with water from Dundee, on Feb. 7, is attributed by Mr. Banter, the Engineer to the Dundee Water Commission, to the stagnant water in the fire-cocks getting frozen, and interfering with the flow of water. There are fire-cocks on the bridge every 300 yards. The stoppage of the supply only lasted for six hours. Complaint has been made to the Glasgow Health Committee of the action of some factors who, when it began to be feared that water-pipes might freeze, cut off the supply of water from whole tenements. The effect was the opposite of what was intended, as the water which was rendered stagnant on the cessation of the flow, at once froze; and the inhabitants were put to great inconvenience. The Health Committee directed an inquiry by the Clerk as to the powers they possess for preventing the cutting off of water at the beginning of a frost. It certainly looks a foolish practice.

It is intimated that the Glasgow Gas Commissioners have received a number of claims for injuries sustained by victims of the recent occurrences in connection with escapes of gas in the city. Two members of the Gas Committee have been empowered to deal with them; and they have succeeded in settling some of them privately. Others are, however, of such an unreasonable nature that they cannot, if persisted in, be settled without the intervention of the Law Courts. One such, for instance, is a claim for injury done to greenhouse plants by being subjected to gas. This raises a novel question, which will require scientific evidence to decide.

The gas-rental collected in Glasgow during the current year amounts to £244,664—an increase over the same period of last year of £8471. This, with the price of gas at the same figure as it was last year, shows an expanding business. The sum received for the supply of electric current is £9957—an increase of £870. Yet we are being told that the demand for electric lighting is growing rapidly. It is to be observed that since last year a number of additional street-lamps have been erected; and the income from these may account for a considerable portion of the increase. It would therefore look as if the district served with electricity has about reached the point of saturation, and we may expect to hear proposals soon for an increased outlay of capital for the extension of the installation, so as to attract more revenue.

The contract for the supply of new gas-mains which are to be laid by the Glasgow Corporation has been given to Messrs. R. Laidlaw and Son; and the Airdrie Iron Company are to provide the cast-iron columns which are required in connection with the Dawsholm and Tradeston works.

Lord Kyllachy, on Wednesday, in the Court of Session, disposed of the action to which I referred last week, in which the Corporation of Glasgow sued a firm of Dundee coal exporters for £240 as the price of a cargo of coke. His Lordship's opinion was that the sale was not by sample; the sample box of coke which the Corporation sent to the defenders' probable purchaser in Hamburg never having entered into the correspondence connected with the contract. That was sufficient for the disposal of the action, without going into the other question which was raised. He therefore found that the defence failed; and he gave decree in favour of the Corporation for the amount sued for.

A point of some importance in connection with coal contracts was disposed of in the Second Division of the Court of Session on Thursday. Messrs. James M'Kelvie and Co., the well-known cannel coal merchants,

of Edinburgh, entered into a contract with the owner of the Roughrigg Colliery to take all the output of Forrester's Roughbrigg Blackbraes Cannel. From November, 1893, to February, 1894, the delivery was interrupted owing to a dispute with the miners in the colliery; and Messrs. M'Kelvie went into the market, and purchased other coal at a higher rate. The owner of the colliery sued them for £112 as a balance due for coal delivered; and when Messrs. M'Kelvie claimed to be entitled to deduct the amount of the difference which they had had to pay for the other coal, the pursuer replied that under the strike clause in the contract, he was exempted from making delivery during the period it lasted. In disposing of the case, Lord Young, who gave the leading opinion, said that between the date of the contract and the month of November, the wages of the colliers had risen so as to make the contract a very unprofitable one at the rates contracted for; that the coalmaster therefore applied to Messrs. M'Kelvie to relieve him of the obligation to deliver; and that Messrs. M'Kelvie declined to relieve him, and sent orders for delivery of coal, which were refused upon the ground that the men would not work at the only wages which he was prepared to give. The way the coalmaster took to deal with the matter was to put up a notice that a reduction would be made of 1s. per ton upon their wages. The men would not accept that, and ceased working. The proposed reduction was upon the rate of wages which was being paid to other colliers by other coalmasters. His Lordship was of opinion that this was not a strike, or other unforeseen circumstance, which would excuse the coalmaster's failure to answer demands for delivery in and after November; and that therefore there was breach of contract, which entitled the defenders to set off their loss against the price which was claimed. The other Judges concurred, and the Court practically gave the defenders absolvitor, with expenses.

The gas-rental collected in Dundee during the ten months ending with February amounted to £54,328—an increase of £753 upon the same period of last year. The Gas Committee have recommended the acceptance of the offer of Messrs. Clayton, Son, and Co., of Leeds, for the supply of a new condenser at the gas-works. At a meeting of the Committee on Tuesday, a circular from the Board of Trade was read regarding explosions of gas in street culverts. The Manager (Mr. M'Crae) explained that they had had no explosions of the kind, which he attributed to the careful manner their mains were laid.

Yesterday a deputation from the newly-constituted Falkirk Gas Commission visited the gas-works at Hamilton and Coatbridge for the purpose of seeing how they were conducted. On Monday, they visited the gas-works at Perth and Alloa, to ascertain how the Peebles oil-gas plant works in those places. At all the places visited, they were highly pleased with what they saw. As a result, it is intimated that Mr. P. B. Watson, the Manager at Falkirk, has recommended the adoption of the Peebles process for the manufacture of gas from oil, and Mr. G. R. Hislop's system of regenerative retort-settings.

A month ago, the Hamilton Town Council resolved to get a report by an expert regarding the proposal of the Manager (Mr. W. Ewing) to expend £17,440 upon extensions at the gas-works. Since then Mr. William Key, of Glasgow, has been called in; and at the meeting of the Town Council on Thursday, his report was read. Mr. Key recommends the execution of works, the cost of which he estimates at £18,450. The Council agreed that the Committee should meet with Mr. Key, and discuss his proposals with him.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 9.

Sulphate of Ammonia.—There is very little change in the market; but the tone is rather quieter, in consequence of some second-hand parcels being pressed for sale. Whether this is being done with the object of lowering values, is at present difficult to say. The demand, however, from consumers has slackened; but the heavy shipments point to the fact that the orders have at some time been booked by the dealers, who, however, appear to have covered their present requirements. The season is undoubtedly a late one; and the buying by consumers direct may therefore be delayed until late in the month. Hull and Liverpool are nominally quoted £11 5s.; while sales at Leith are reported at £11 2s. 6d. Owing to the exceptional circumstances already stated, nitrate on spot is still changing hands at 9s. per cwt.

LONDON, *March* 9.

Tar Products.—Pitch continues steady at former rates. Buyers are pressing very hard for a reduction for forward delivery. The position, however, points to a scarcity of stuff in the summer months. It is therefore unlikely that any important decrease in value will take place. Benzols are firm at a slight advance on the previous week, and considerable inquiry exists. The future of this product is distinctly hopeful. Creosote and common oils are flat and unsaleable. There is a better outlet for naphthalene, especially of the "pressed" and the fine quality. Carbolic acid is in request at Committee rates; while cresylic acid is neglected, and difficult to dispose of. Anthracene is reported in better odour; and it is rumoured that a large business has recently been done in this article. Solvent naphtha continues dull and weak, owing largely to the impossibility of shipping it to many ports, in consequence of the continued frost. To-day's values are as follows: Tar, 18s. to 21s. 6d. Pitch, 32s. 6d. Benzols, 90's, 1s.1d.; 50's, 1s. 0½d. Solvent naphtha, nominal, 1s. 1d. Toluol, 1s. 3d. Crude, 30 per cent., naphtha, 4½d. Creosote liquid, 2d.; ordinary, 1⅜d.; salts, 20s. Cresylic acid, nominal, 1s. Carbolic acid 60's, 1s. 6½d. Anthracene, "A," 1s. 1d.; "B," 10½d.

Sulphate of Ammonia, after a short active period at improving rates, is now again neglected, and price is weaker. Business has been done during the week at prices ranging downwards from £11 7s. 6d. to £11 2s. 6d., less 3½ per cent., usual terms; the latter price being to-day's value at all ports. Gas liquor is offered at 7s. 6d. to 9s. 6d.

Gas Supply in the Colonies.—Reports of some colonial gas undertakings, including an account of the proceedings at the last meeting of the Melbourne Gas Company, have lately reached us; but we must reserve notice of them for a subsequent issue.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The demand for most descriptions of fuel is tolerably large; and supplies generally are moving off pretty freely at late rates. Merchants in some cases continue to hold back from placing orders, except for immediate wants, on account of the action taken by the railway companies in the matter of siding rates; but this has no material effect on the ordinary trade at the yards. A good business is still doing in house-fire coals, with pits in some cases working six days to the week. Steam and forge coals are also in moderate request; and engine fuel finds a pretty ready sale. The inconvenience caused by the frozen state of the canals has now been entirely removed; and deliveries in this direction are again in full swing. Prices generally are firm at late quotations. Best Wigan Arley averages 10s. 6d. to 11s. per ton at the pit mouth; Pemberton four-feet and seconds Arley, 9s. 6d. to 10s.; common house coals, 7s. 6d. to 8s.; steam and forge coals, 6s. 6d. to 7s.; and engine fuel, 3s. 6d. to 4s. for common, up to 4s. 6d. and 5s. to 5s. 3d. for better qualities. A somewhat larger demand comes forward for shipment, and prices are well maintained—8s. to 8s. 6d. per ton being about the average selling prices for Lancashire steam coal, delivered on the Mersey.

Northern Coal Trade.—There has been considerable activity in the coal trade of the North the last few days, because the expectation of a strike in South Wales has caused many consumers of coal who were delaying orders in hopes of lower prices to give out contracts, lest that strike should force up rates. Hence the collieries are much better employed, though the prolonged winter still limits the shipments. Best Northumbrian steam coals have risen to about 9s. per ton for immediate delivery; while for delivery next month higher figures are asked, though they are not as readily paid. Second-class steam is also correspondingly higher; and steam small coals are, for prompt delivery, from 3s. to 3s. 3d. per ton f.o.b., with a higher rate quoted for delivery forward in the season. Gas coals are still in very large delivery; the consumption continuing good, and the stocks having apparently been reduced. The price of best Durham gas coals varies from 6s. 9d. to 7s. 6d. per ton f.o.b., with a steady demand. Manufacturing coals are easy in price; but the request is rather larger than it was. The coke trade is very unequal; exports and local consumption being about up to the average, but strikes in the Furness district very greatly reduce the quantity sent to that centre. The price of best Durham coke varies from 13s. to 14s. per ton f.o.b. Gas coke is steady, and shipments keep down the stocks; the home consumption varying very little. Prices are unchanged this week. The general tendency of the coal trade towards lower prices has been checked by the uncertainty as to the working in South Wales, which would drive orders this way if owners would accept current prices for future deliveries.

Scotch Coal Trade.—There is still a feeling of suspense in the coal market in Scotland. Until a settlement be effected in Wales, there is little likelihood of any decided line of policy being adopted by owners in Scotland. In the meantime, prices have, if anything, improved; and offers are being made of forward contracts. These, however, are being looked at warily, because, if it should turn out that trouble ensues in Wales, then better prices could be had here. With this consideration, and the fact that this is the dead season so far as the Baltic trade is concerned, there is not much activity in the market; and coal is being stacked rapidly. Splint and ell coal are in most demand. The prices quoted are: Main, 6s. to 6s. 3d. per ton f.o.b. Glasgow; ell, 7s. to 7s. 3d.; splint, 6s. 6d. to 6s. 9d.; and steam, 7s. 9d. to 8s. The shipments for the week amounted to 103,528 tons—an increase over the quantity shipped in the preceding week of 9002 tons, but a decrease on the corresponding week of last year of 21,067 tons. For the year to date, the total shipments have amounted to 360,474 tons—a decrease as compared with the corresponding period of last year of 293,855 tons.

The Daventry Town Council and the Water-Works.—At a recent special meeting of the Daventry Town Council, Alderman Thornton presented a report from the Water Supply Committee, in which they said that, after carefully considering all particulars they could obtain, and submitting them to Mr. Eunson, they resolved unanimously to recommend the Council to offer the Water Company to take over their undertaking at 25 years' purchase, less 10 per cent. for depreciation; being a sum of £3120, more or less, without prejudice, and subject to the sanction of the Local Government Board. It was resolved to adopt the report, and to make the offer through Mr. Eunson.

The Profits of the Batley Corporation Gas-Works.—At the meeting of the Batley Town Council last Thursday, a recommendation of the Gas Committee that £2000 should be transferred from their revenue account in aid of the rates for the year ending on the 25th inst. called forth a protest from Alderman Brooke, the Chairman of the Committee. He said he dissented from the proposal on the ground that the £2000 would be granted in aid of the reduction of rates, the benefit of which would be participated in by certain persons who did not consume gas at all. The reduction would be equivalent to a rate of 6d. in the pound. After a long discussion, the recommendation was confirmed.

Reductions in Price.—The Tonbridge Gas Company have resolved to reduce the price of their gas from 3s. 6d. to 3s. 4d. per 1000 cubic feet.——The Harrogate Gas Company have decided to reduce their gross price from 3s. 4d. to 3s. per 1000 cubic feet as from the 1st of July next.——The Hoddesdon Gas Company will reduce their price by 2d. per 1000 cubic feet (making it 4s. net) after the 1st prox.——The Exeter Gas Company have lowered their price from 3s. 1d. to 3s. per 1000 cubic feet, as from Jan. 1 last.——The Stretford Gas Company have reduced the price of gas to private consumers by 2d. per 1000 cubic feet, and to local authorities for public lighting purposes by 3d.——The Directors of the City of Wells Gas Company announce a reduction of 5d. per 1000 cubic feet (from 4s. 2d. to 3s. 9d.) in the price of gas.——Notice has been given by the Directors of the Tunbridge Wells Gas Company of a reduction in price of 3d. per 1000 cubic feet to all consumers; making the charge 3s. This will apply to the accounts for the current quarter.

Gas, Water, and General Investment Trust.—The Directors recommend the usual dividend at the rate of 4½ per cent. per annum on the preferred stock, and a dividend at the rate of 3 per cent. per annum on the deferred stock of the Company. This, with 2½ per cent. paid thereon in August last, makes a dividend of 4 per cent. for the year. The balance carried forward is £5069.

Gas and Electric Lighting at Burton-upon-Trent.—At the meeting of the Burton-upon-Trent Town Council last Wednesday, the Chairman of the Gas Committee (Alderman Lowe) gave a not very encouraging account of the electric lighting undertaking of the Corporation, as will be found from the remarks reported under the heading "Electric Lighting Notes" in another column. On the same occasion, however, he told a different story in regard to the gas undertaking. He stated that the increase in the consumption of gas during the past month was the greatest in the history of the gas supply of Burton. It was an ill wind that blew nobody any good; but the recent severe weather seemed to have been an advantage to the Committee. Although they had the electric light, the consumption of gas did not decrease, but increase; and what was the most surprising was that this should have taken place after the price was raised. He was glad to say the Committee proposed to go back to the price paid twelve months ago. He believed there would be a considerable profit on the gas-works.

Coal and Oil Gas Manufacture.—This was the title of a lecture delivered by Mr. E. C. Riley, the Gas Engineer of the Great Western Railway Company, before the Gloucestershire Engineering Society, on Monday last week. He sketched the early history of the employment of gas for illuminating purposes; and said that, although some might think that gas manufacture was becoming a thing of the past, he ventured to suggest that, in many of its applications, it was almost in its infancy. The plant and apparatus for the manufacture, distribution, and consumption of gas had, he pointed out, been continually changing and developing. The process of coal and oil gas manufacture, and their various uses were next graphically described. Speaking of the composition of coal, he gave the following as that of the Parkfield coal in the Forest of Dean: Carbon, 82·069 per cent.; hydrogen, 5·613; nitrogen, 0·940; sulphur, 1·457; oxygen, 6·391; and ash, 3·530. The area of the coal-fields was stated; and the mode of testing the illuminating power of both coal and compressed oil gas was explained. At the close of the lecture, a vote of thanks was accorded to Mr. Riley.

Bangor Corporation Gas Undertaking.—Two or three matters affecting the gas undertaking were under consideration at the meeting of the Bangor City Council last Wednesday. It was announced by the Water and Gas Committee that Mr. T. Newbigging had inspected the works, and that his observations would shortly be submitted to the Council in the shape of a report. The Committee, acting upon a suggestion made by an Inspector of the Local Government Board at a recent inquiry, also recommended that the borrowing powers of the Council be increased by £10,000, instead of £2500, a large portion of which is required for gas purposes. Criticizing the proposed expenditure on the gas-works, Dr. Edwards asked whether the time had not come, seeing the rapid strides Bangor was making, when the Council should consider the advisability of spending the money in question upon electric lighting. He was afraid that, if £10,000 was now secured for improving the gas-works, electric lighting for the city would be thrown back a generation. He moved that the Committee be instructed to report upon the expediency and cost of providing electric lighting before proceeding to expend any large amount on the gas-works, and report to the next meeting. Mr. Hughes seconded the motion. Alderman Lewis made a statement bearing upon the history of the gas undertaking since its purchase by the Local Authority. In spite of disparaging remarks made by members of the Council, he maintained that the works had been an unmistakable boon to the ratepayers. If there was any truth in the assertion that the works involved a loss year after year, it was entirely owing to the low price at which gas was sold. Mr. Williams, as one of the members alluded to by the last speaker, still adhered to his contention that the concern was not a paying one, and was not properly managed. Both the recommendation of the Committee and the resolution proposed by Dr. Edwards were adopted.

The Public Lighting of Ipswich.—At the meeting of the Paving and Lighting Committee of the Ipswich Corporation on the 1st inst., the Town Clerk (Mr. W. Bantoft) stated that the resolution passed at the previous meeting, to the effect that, in future, the value of the gas unconsumed by lamps not alight should be deducted from the Gas Company's account (the practice having hitherto been not to make a deduction for the first night a lamp was unlighted), had been communicated to the Company; and Mr. Jolliffe, their Secretary, had sent a letter in reply. Mr. Jolliffe said his Directors could not accept the resolution, as its adoption would impose upon the Company a condition which was quite new and, in the Directors' opinion, unfair. He indicated the various ways in which lights left in perfect order might be extinguished—gales of wind, fractures of glass, mischievous boys, and even adults—without any neglect on the Company's part; and he pointed out that these lamps really cost more than if they were alight. Not only was the gas escaping, but somebody had to be sent to examine the lamp, and make good any defect. The Vice-Chairman (Mr. H. W. Raffe) said it should be borne in mind that, when the custom of not making a deduction for the first night originated, the Company allowed the Corporation 2½ per cent. discount, which had since been taken off. The Town Clerk expressed the opinion that such a long-continued course of action could not reasonably be terminated without some notice; and he suggested three months as fair. He referred to the Richmond case, in which the Court held that it was unreasonable to say that if, from any cause over which a gas company had no control, the lamps were not lighted, the company would not be entitled to their full amount. Mr. Josselyn moved that a quarter's notice be given to the Company of the intention of the Corporation to alter the existing custom. The Vice-Chairman seconded the motion. The Gas Inspector said that in the whole year 1894 only 1029 lamps were out; whereas in the month of February, 1895, 4000 had not been alight. He thoroughly believed the lamps out in 1894 were extinguished in the way Mr. Jolliffe had suggested. The motion was carried.

Redcar Water Supply.—Last Tuesday week, Colonel Luard, R.E., held an inquiry, at the offices of the Redcar District Council, into the circumstances under which the Council applied to the Local Government Board for sanction to borrow £1600 for works of water supply. The proposal is to take a fresh supply of water from a new spring named Soap Well, and the construction of a reservoir. The Surveyor (Mr. M. Armitage) detailed the history of the water-works, and stated that loans had been obtained amounting to £7491, and a balance of £2009 remained. The sum had to be repaid in three terms of ten, six, and three years. The water was secured from a spring belonging to the Marquis of Zetland, and the reservoir held 450,000 gallons. The Engineer (Mr. Lisle, of Darlington) said it was proposed to construct the new reservoir lower down on the same stream, and was merely an extension of the rights of the stream, which flowed on to the sea. The extent of the proposed new reservoir was 4½ acres. A rent of £32 was to be paid for the site, on a lease for 99 years. The normal population was 2800, and in summer 5600. They had only ten days' supply of water for their nominal population; and the service had to be cut off between 10 p.m. and 6 a.m. With the new reservoir, they would have a ten weeks' summer supply. The production of the Wort well was 37 gallons, and of the Soap Well 2 gallons a minute—making a total of 39 gallons. If the water was purchased from the Cleveland Water Company at the rate of 7d. per 1000 gallons, it would cost £554 per annum. Colonel Luard asked Mr. I'Anson, the Secretary of the Cleveland Water Company, if this was a fair price. Mr. I'Anson: "We charge 7d. at Coatham." Mr. Lucas said he was Solicitor to the Cleveland Water Company, who appeared, as ratepayers, to object. They thought there was danger of the wells giving out, owing to the subsidence through mine workings. Mr. Lisle said this was not so. Colonel Luard asked where the Cleveland Company obtained their water. It was explained, amid much amusement, that, beneath the Company's reservoir, mines were being worked, and that the reservoir was not covered as Mr. Lucas had suggested the new reservoir should be. The inquiry was closed after several ratepayers had spoken in favour of the application.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 530.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	11 Oct.	10½	Alliance & Dublin 10 p. c.	10	21–22	..	4 15 6
100,000	10	,,	7½	Do. 7 p. c.	10	14–15	..	5 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105–107	..	4 13 4
200,000	5	14 Nov.	6½	Bombay, Limited	5	6¼–6¾	..	4 16 5
40,000	5	,,	6½	Do. New	4	4¾–5	..	5 4 0
380,000	Stck.	28 Feb.	11½	Brentford Consolidated	100	243–248*	..	4 12 8
180,000	,,	,,	8½	Do. New	100	195–200*	..	4 5 0
220,000	Stck.	28 Sept.	11	Brighton & Hove Original	100	225–230	..	4 15 8
888,500	Stck.	28 Feb.	5	Bristol	100	115–117*	..	4 5 6
320,000	20	28 Sept.	11½	British	20	50½–51½	+½	4 7 3
50,000	10	30 Aug.	11½	Bromley, Ordinary 10 p. c.	10	21½–22¾	..	5 2 2
51,510	10	,,	8½	Do. 7 p. c.	10	16½–17½	..	4 17 2
328,750	10	14 Nov.	2	Buenos Ayres (New) Limited	10	6–6¼	..	3 1 6
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	100–103	..	5 16 7
150,000	20	28 Feb.	8½	Cagliari, Limited	20	26½–27½*	..	6 0 0
550,000	Stck.	11 Oct.	13¾	Commercial, Old Stock	100	287–292	+5	4 12 5
165,000	,,	,,	10¾	Do. New do.	100	215–220	+8	4 15 5
160,762	,,	13 Dec.	4½	Do. 4½ p. c. Deb. do.	100	130–135	..	3 6 8
800,000	Stck.	13 Dec.	13	Continental Union, Limited.	100	247–252	+2	5 3 2
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	205–210	..	4 15 3
535,000	Stck.	28 Feb.	5½	Crystal Palace Ord. 5 p. c. Stk	100	115–120*	..	4 7 6
486,090	10	31 Jan.	11	European, Limited	10	24–25	..	4 8 0
354,060	10	,,	11	Do. Partly paid	7½	16½–17½	..	4 14 3
5,646,590	Stck.	14 Feb.	12	Gaslight & Coke, A, Ordinary	100	262–267	–5	4 9 10
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	105–110	..	3 12 9
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	275–280	..	3 11 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130–135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	197–202	..	3 14 3
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	183–188	..	3 14 6
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	275–280	..	3 11 5
476,000	,,	,,	6	Do. K, 6 p. c. Prf..	100	163–168	..	3 11 5
1,061,150	,,	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	127–130	..	3 1 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	140–145	..	3 2 1
908,000	,,	,,	6	Do. 6 p. c. do.	100	188–192	..	3 2 6
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	235–240	–2	5 0 0
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd.	5	5½–6¼	..	4 16 0
560,000	100	1 Oct.	5	Met.of Melbourne, 5 p.c. Deb.	100	111–113	..	4 8 6
541,920	20	14 Nov.	5	Monte Video, Limited	20	15½–16½	..	6 1 2
150,000	5	29 Nov.	8	Oriental, Limited	5	7–7½	..	5 6 8
60,000	5	13 Sept.	7	Ottoman, Limited	5	4½–4¾	..	7 7 4
166,870	10	14 Feb.	2	Para, Limited	10	1½–2½	..	8 0 0
420,000	100	2 Nov.	6	People's Gas of Chicago—1st Mtg. Bds.	100	105–109	..	5 10 1
500,000	100	1 Dec.	6	2nd Do.	100	102–107	..	5 12 1
150,000	10	11 Oct.	6	San Paulo, Limited	10	8¾–9¾	..	6 6 4
500,000	Stck.	14 Feb.	15½	South Metropolitan, A Stock	100	355–365	+5	4 4 10
1,350,000	,,	,,	12	Do. B do.	100	293–298	+1	4 0 7
290,000	,,	,,	13	Do. C do.	100	307–312	+2	4 3 4
775,000	,,	16 Jan.	5	Do. 5 p. c. Deb. Stk.	100	167–172	..	2 18 2
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	225–230*	..	5 0 0
				WATER COMPANIES.				
746,021	Stck.	28 Dec.	10¾	Chelsea, Ordinary	100	285–290	+5	3 9 10
1,719,514	Stck.	11 Oct.	8	East London, Ordinary	100	225–230	+6	3 9 7
654,740	,,	28 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	147–152	..	2 19 2
700,000	50	13 Dec.	8½	Grand Junction	50	115–119	+2	3 11 5
708,000	Stck.	14 Feb.	12	Kent	100	300–310	..	3 17 5
1,043,800	100	28 Dec.	9½	Lambeth, 10 p. c. max.	100	260–265	+2	3 11 8
406,200	100	,,	7½	Do. 7½ p. c. max.	100	205–210	+3½	3 11 5
330,000	Stck.	28 Sept.	4	Do. 4 p. c. Deb. Stk.	100	130–135	..	2 19 3
500,000	100	14 Feb.	12½	New River, New Shares	100	380–385	..	3 6 2
1,000,000	Stck.	31 Jan.	4	Do. 4 p. c. Deb. Stk.	100	140–143	+3½	2 15 11
902,300	Stck.	13 Dec.	6	S'thwk & V'xhall, 10 p.c. max.	100	157–162	+7	3 14 1
126,500	100	,,	6	Do. D 7½ p.c. do.	100	152–157	+4	3 16 5
1,155,066	Stck.	13 Dec.	10	West Middlesex	100	275–280	+5	3 11 5

*Ex div.

† Next dividend will be at this rate.

Incandescent Gas Lighting at Wells.—Two of the principal streets of Wells have been successfully and brilliantly lighted for the past three months by the City of Wells Gaslight Company (of which Mr. C. V. Bennett is Secretary and Manager) by means of incandescent burners. The improvement is giving the greater satisfaction to the public by reason of its being unsolicited.

The Gas Exhibition at Tunbridge Wells.—The gas exhibition held by Messrs. Richmond and Co., Limited, at Tunbridge Wells, as noticed in the JOURNAL for the 5th inst., closed last Thursday. It was highly successful, and was visited by a number of gas engineers from the district. The result has been an extended appreciation of gas for culinary purposes; the Gas Company having ordered upwards of 80 cookers from the firm.

Ottoman Gas Company, Limited.—The Directors of this Company report that the gas-rental for the half year ending Dec. 31 last amounts to £8965; and the net profit, to £3810. The amount standing to the credit of profit and loss account is £4336, out of which the Directors recommend that £1000 shall be placed to the reserve fund, and £2625 be paid to the shareholders in a dividend at the rate of 7 per cent. per annum on both classes of shares—leaving £711 to be carried forward. The Directors regret to record the death of their esteemed colleague Mr. E. Horner, who was one of the first Directors, and for many years the Chairman of the Company. The vacancy thus created has been filled by the election of Colonel James Le Geyt Daniell, who is a member of the Board of the Malta and Mediterranean Gas Company, Limited. The Directors also regret to announce the resignation of Mr. A. J. King, for nearly 30 years the Secretary of the Company, in consequence of ill-health. They have granted him a retiring allowance in consideration of the good service rendered by him to the Company, which they have no doubt will meet with the approval of the shareholders. Mr. T. Guyatt, who has been closely associated with Mr. King for many years, has been appointed to succeed him.

Exhibition of Gas Appliances.—An exhibition of Messrs. Fletcher, Russell, and Co.'s gas cooking-ranges, heating stoves, and other appliances was held, at Clifton, Bristol, from Tuesday to Friday last week. The advantages possessed by gas over other fuels for cooking purposes were demonstrated by Miss Westlake. During this week, the same firm are exhibiting at St. Andrew's Hall, Plymouth; and lectures are being delivered twice daily by Miss Helen Edden.

The Working of the Deacon Waste-Meter System at Douglas, Isle of Man.—At a recent meeting of the Douglas Town Commissioners, the report presented by the Water Committee contained one by Mr. Rowbotham, of the Acme Engineering Company, on the results of the experiments made with two Deacon waste-water meters in the districts in which they had been placed for observation, as requested by the Commissioners (see *ante*, p. 220). On Jan. 13 and 14 last, the supply in No. 1 district, with an estimated population of 200, was 12,465 and 11,870 gallons respectively—an average of 12,168 gallons, or at the rate of 60·84 gallons per head per day. On Jan. 24, it was 8490 or 42·45 gallons per head; being a saving of 3678 gallons on the average of the above-named two days, or 18·39 gallons per head, equivalent to 1,342,470 gallons per annum. In No. 2 district, the average supply for Jan. 12 and 13 was 19,075 gallons to a population of 150, or at the rate of 127·16 gallons per head per day. On Jan. 24, the quantity was 7080 gallons—a saving of 11,985 gallons, or at the rate of 79·90 gallons per head, equivalent to 4,374,525 gallons per annum. The Committee resolved to obtain a 6-inch meter from the Company, and have it fixed at a spot to command eight districts of supply; and also to retain the services of the Company's inspector for a week longer. In moving the adoption of the report, Mr. Goldsmith remarked that the meters were doing excellent work; leaks to the extent of several thousand gallons a night having been detected by their aid. A member pointed out that there was a great waste of water from flushing-carts; but the Clerk said the meters would discover this. The report was adopted.

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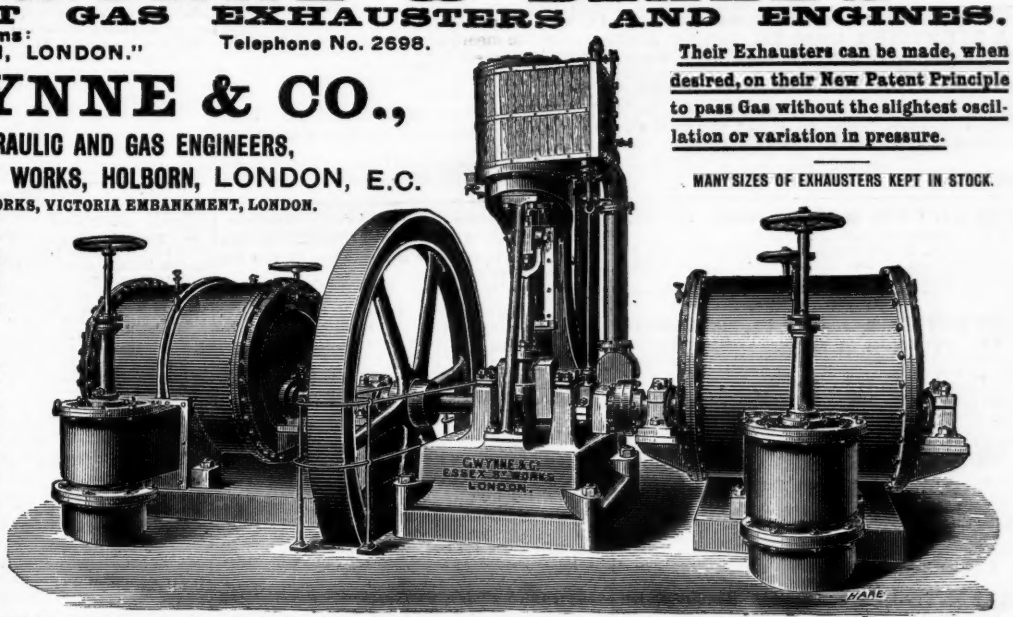

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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

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*** See Advertisement p. II., centre of JOURNAL.
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March, 1895.

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Candidates to state Age and previous Experience.
Copy of the duties may be obtained from Mr. W. Smith, Engineer, Lum Street Gas-Works, Bolton.
Applications, together with not more than three recent Testimonials, to be addressed to Mr. Alderman Miles, Chairman, and delivered at the Gas Offices, Bolton, not later than Thursday, the 21st of March, 1895.
By order,
R. G. HINNELL,
Town Clerk.
Town Hall, Bolton,
March 8, 1895.

KING'S TREATISE ON COAL GAS.
WANTED to Purchase, a copy of Vol. I. of this work, if in good condition, or a set of the three Volumes would be bought cheap.
Address No. 2489, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE URBAN DISTRICT COUNCIL OF PADIHAM.
(GAS DEPARTMENT.)
THE Gas Committee of the Urban District Council of Padiham invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR, to be produced at the Gas-Works, Padiham, during the Year ending March 31, 1896.
Sealed tenders, addressed to the Chairman, Gas Committee, District Council Offices, Padiham, must be sent to me not later than Saturday, March 23 inst.
For Particulars, apply to
J. R. SMITH,
Clerk to the District Council.
Padiham, March 8, 1895.

COUNTY BOROUGH OF STOCKPORT.
(GAS DEPARTMENT.)
TO RAILWAY WAGGON BUILDERS & OTHERS.
THE Gas Committee are prepared to receive TENDERS for the supply of Ten 10-ton COAL-WAGGONS, with two Sides, Bottom and End Doors, and Steel Under-frame. Six of them must have removable Coke-Racks.
All Information can be obtained on application to the Engineer, Mr. S. Meunier, Millgate Works, Stockport, to whom Contractors will be required to forward, not later than the 23rd inst., full Drawings and Specifications of the Waggons proposed to be supplied; but tenders, endorsed "Coal-Waggons," must be addressed to the Chairman of the Gas Committee, and sent in not later than Wednesday, the 27th inst.
No tender will be accepted without satisfactory proof that the firm tendering pays the standard rate of wages, and observes the standard number of hours.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
WALTER HYDE,
Town Clerk.
Stockport, March 7, 1895

HYDRATED OXIDE OF IRON.
PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

In Paper Covers, Post Free, Price 2s.
S. CARPENTER on the Purification of COAL GAS from CARBONIC ACID and the SULPHUR COMPOUNDS by LIME, OXIDE OF IRON, and ATMOSPHERIC AIR.
S. & H. W. CARPENTER, 3, Bedford Villas, Carshalton, SURREY.

HYDRAULIC MAINS.
ACCUMULATION of thick Tar entirely prevented. A great reduction in Stopped Ascension-Pipes by using CARPENTER'S PATENT HYDRAULIC MAIN CLEANER. No expense beyond first cost.
All Particulars on application to S. & H.W. CARPENTER, Vulcan Iron-Works, Rhodeswell Road, Limehouse, LONDON, E.

TO TAR DISTILLERS.
THE Gas Committee of the Corporation of Wokingham are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works during the Twelve Months ending the 1st of April, 1896.
Sealed tenders, endorsed "Tender for Tar," to be addressed to the undersigned, at the Works, by March 25, 1895.
ALFD. G. BATES,
Secretary and Manager.
Wokingham, March 6, 1895.

THE Elmsall and South Kirby Gas Com- pany invite TENDERS for the supply and erection of a single GASHOLDER, 45 feet diameter by 14 ft. 8 in. deep, with Wrought or Cast Iron Tank.
For Specification and Particulars, apply to Mr. Matt. Dunn, Engineer, Gas-Works, Selby, to whom sealed tenders are to be sent not later than the 29th of March, 1895.
The lowest or any tender not necessarily accepted.
By order,
CHARLES SCHOLEFIELD,
Proprietor.
Gas-Works, South Elmsall, *via* Doncaster.

TAR.
THE Direction of the Gas-Works at Rotterdam invites TENDERS for the purchase of the TAR produced during Two Years at most, from the 1st of June next. Yearly production, from about 80,000,000 kg. Coal.
Tenders, stating the time during which the production is desired, the price per hectolitre in Dutch money, and written in Dutch language on stamped paper, must be delivered at the Office of the Gas-Works, not later than the 19th of March, 1895.
Specification may be had on application to the MANAGER of the Gas-Works at ROTTERDAM.

TODMORDEN URBAN DISTRICT COUNCIL.
TENDERS FOR CAST-IRON PIPES.
THE Gas Committee of the Todmorden Urban District Council are prepared to receive TENDERS for the supply of 1000 yards 4-inch CAST-IRON PIPES.
Full Particulars may be had on application to the undersigned.
Sealed tenders to be sent in not later than Noon on Tuesday, the 19th inst., addressed to the Chairman of the Gas Committee, and endorsed "Cast-Iron Pipes."
By order,
GEORGE E. SAVILLE,
Engineer and Manager.
Gas-Works, Todmorden,
March 5, 1895.

TO TAR DISTILLERS AND OTHERS.
THE Directors of the Ossett Gas Com- pany are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR and surplus TAR produced at their Works during the next Twelve Months.
The Liquor can be loaded into Tank-Waggons, at the Lancashire and Yorkshire Railway Siding, Healey, Ossett.
Liquor to be quoted for both by Twaddel's and Wills's Tests.
Tenders to be sent in not later than Wednesday, the 27th inst.
By order,
JAS. CASTLE,
Secretary.
Ossett, March 7, 1895.

THE Gas Committee of the Leeds Cor- poration are prepared to receive TENDERS for the supply of DRY GAS-METERS, to be delivered at their Gas-Works during a period of Twelve Months from receipt of order.
Each party tendering is required to send, on or before Saturday, the 16th of March next, two sample Three-Light Meters (one of which is to be open for examination), addressed Gas-Meter Works, Dewsbury Road, Leeds.
Forms of Tender may be obtained on application at the Offices of the Gas Department, Municipal Buildings, Leeds.
Endorsed tenders, addressed to the Chairman of the Gas Committee, at the latter address, will be received not later than Wednesday, the 20th of March next.
The Committee do not bind themselves to accept the lowest or any tender.

BOROUGH OF DEWSBURY.

THE Gas Committee invite Tenders for the supply of RETORTS, FIRE-BRICKS, &c.

Particulars of Quantities and Forms of Tender may be obtained from Mr. Chas. A. Craven, Engineer and Manager, Savile Town Gas-Works, Dewsbury.

The Contractors will be required to give an assurance that they will pay to the efficient and capable workmen employed by them not less than the minimum standard rate of wages in each branch of the trade.

Sealed tenders, endorsed "Tender for Retorts," to be sent to me the undersigned not later than Saturday, the 16th inst.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
E. MAWDESLEY,
Town Clerk.

Town Clerk's Office, Town Hall,
Dewsbury, March 6, 1895.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ASSEMBLY of Proprietors will be held at the Company's Offices, St. Helen's Place, Bishopsgate, E.C., on Thursday, the 4th of April, 1895, at Twelve o'clock noon precisely, pursuant to Act of Parliament.

The TRANSFER BOOKS in respect of the Ordinary Stock WILL BE CLOSED on the 20th of March, and REOPENED on the 11th of April, on which day the Dividends on this Stock will be payable.

By order,
I. A. CROCKENDEN,
Secretary.

St. Helen's Place, E.C.,
March, 1895.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office, on Wednesday, the 27th inst., at Half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.

Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 16th, and REOPENED on the 28th inst.

By order of the Court of Directors,
FREDERIC LANE LINGING,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 8, 1895.

OTTOMAN GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY MEETING of the Shareholders in the above Company will be held at the Offices of the Company, 9, Queen Street Place, Cannon Street, E.C., on Tuesday, March 19, at One o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st day of December last, to declare a Dividend, to elect Directors and Auditors, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from March 12 to 19, both days inclusive.

By order,
THOMAS GUYATT,
Secretary.

9, Queen Street Place,
Cannon Street, E.C.,
March 5, 1895.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given, that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on Thursday, the 4th of April, 1895, at Twelve o'clock at Noon,

To receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st of December, 1894;

To declare a Dividend;

And to elect Directors and an Auditor in the place of those retiring.

The STOCK TRANSFER BOOKS WILL BE CLOSED from the 22nd of March inst. to the 4th of April next, both days inclusive.

By order of the Board,
H. D. ELLIS,
Secretary.

Offices: Stepney,
March 11, 1895.

NOTICE.

TO GAS ENGINEERS AND OTHERS.

MESSRS. CLAPHAM BROS., Limited, Keighley, Yorkshire, are no longer authorized to Manufacture my CONDENSER and WASHER-SCRUBBERS.

The above-named Gas Apparatus are erected and giving entire satisfaction at the following places: Neath, Lincoln, Sheffield, Ellesmere, Mountain Ash, Malden, Cullingworth, Montreal (Canada), Woodstock (South Africa), Cape Town (South Africa), &c.

These Appliances can now be obtained solely of the undersigned.

Winchester House, London, E.C. J. A. KELMAN.

NOTICE.

TO GAS ENGINEERS AND OTHERS.

CLAPHAM BROS., LIMITED, of Keighley, Yorks., beg to intimate that they are the SOLE MAKERS of LAYCOCK & CLAPHAM'S "ECLIPSE" WASHER-SCRUBBER, and that no person or persons beyond the Patentees and Makers have ever had any interest whatever in the Patent.

They are also the SOLE MAKERS of CLAPHAM'S PATENT IMPROVED "ECLIPSE" CONDENSER, as supplied to Bradford, Manchester, and other Gas-Works.

Orders and Inquiries promptly attended to. See Advertisement in last week's JOURNAL, p. 516.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton	11,205 Cubic Feet.
Illuminating Power, $16\frac{7}{10}$ Stand. Sperm. Candl.	
Coke (of good & pure quality)	$13\frac{3}{4}$ Cwt. Per Ton.
Sulphur	A little over 1 Per Cent.
Ash	Under 1 Per Cent.
Tar	163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor	103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE, 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton	10,500 Cubic Feet.
Illuminating Power	17 Stand. Sperm Candl.
Coke (of excellent quality)	$13\frac{1}{2}$ Cwt. Per Ton.
Sulphur	1·13 Per Cent.
Ash	1·34 Per Cent.
Tar	180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor	$94\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

HEATHCOTE GAS COAL.

Rich in Illuminating Power & Yield of Gas.

Above the average in Weight & Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR Co., LD.,

CHESTERFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO.,
Central Plumbing Works, Town Hall Square,
BOLTON.

Practical Makers of all kinds of Saturators, and Specialists in every description of Lead Work required in connection with Sulphate Plants.

Special attention to Repairs.

Improved Lead-Burning Machines,
Sulphate Bagging Machines, Copper Scoops, &c.

HIGHEST REFERENCES ON APPLICATION.

COKE BREAKERS.

G. B. Mather & Son, Engineers, Wellingborough

HARCOURT'S COLOUR TEST.

For Carbon Bisulphide, Sulphuretted Hydrogen, and Carbonic Acid in Coal Gas.

The Materials for the above Tests may be obtained from

Mr. S. E. MILLER, 115, Cowley Road, Oxford.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, MINER, AND SHIPPER OF
NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

11, BAY STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."
Established 1872.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

PIPES, 2-in. to 8-in. PIPES, 2-in. to 8-in. PIPES.

MONIER-WILLIAMS & Co.

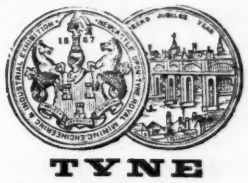
IRONFOUNDERS,

MIDDLESBROUGH.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,

for

CANNEL & COAL.



TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1·301·88 lbs.

EAST PONTOP GAS COAL.

Yie'd of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

LABORLESS WORK
In 1895.

ENGINEERS AND MANAGERS

Making preparations to adopt

SELF-ACTING SYSTEMS OF CARBONIZING

In 1895,

are cordially invited to call and inspect our latest Designs of Automatic Coal and Coke Handling and Charging Machinery.

We send skilled Draughtsmen to get Particulars for Detail Plans.

Address:—

NEW CONVEYOR CO., LTD.,

3 & 4, Lime Street Square, London, E.C.

KENT'S THICK GAS COAL

RAISED AT

The Wharncliffe Woodmoor Colliery,

BARNSLEY.

Yield of Gas, nearly 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham:—

Specific Gravity (Water 1). .	1·276
Weight of One Cubic Foot. .	79·700 lbs.

PROXIMATE ANALYSIS.

Moisture in Coal	2·68 per cent.
Volatile Matter.	35·60 ,,
Fixed Carbon	58·80 ,,
Sulphur	0·96 ,,
Ash	1·96 ,,

COMMERCIAL ANALYSIS.

Gas per Ton of Coal	11,760 cub. feet.
Gas per Cubic Foot of Coal .	418 ,,
Illuminating Power	17·44 candles.
Value of One Cubic Foot in Sperm	418 grains.
Value per Ton of Coal in Sperm	703 lbs.
Coke per Ton of Coal . . .	1367 ,,
Coke	61·05 per cent.
Ash in Coke	3·21 ,,
Sulphur Eliminated with Volatile Products per Ton of Coal	9·4 lbs.
Sulphur in Coke per Ton of Coal	12 ,,
Ammoniacal Liquor per Ton of Coal	19·7 galls.
Tar per Ton of Coal	12·2 ,,

R. O. PATERSON, C.E.

Gas-Works, Cheltenham, 8th August, 1894.

For Price, &c., apply to

THE

Wharncliffe Woodmore Colliery Co

LIMITED.

BARNSLEY.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·4 candles.
Coke	68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,

8 Lombard Street, NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

COKE BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,

PARK STREET, SOUTHWARK, E.C.,

And at STROUD, GLOUCESTERSHIRE.

ALFRED WILLIAMS & Co.

(MATTHEW MILDRED)

71, 72 & 73, BANK SIDE,

SOUTHWARK S.E.

UNIVERSAL PROVIDERS

FOR

GAS, WATER & SEWAGE WORKS.

ENGINEERS & CONTRACTORS

FOR THE ERECTION OF COMPLETE GAS AND WATER WORKS, AND FOR RENEWALS AND EXTENSIONS OF EVERY DESCRIPTION.

PLANS & ESTIMATES ON APPLICATION.

MAIN LAYING AND RETORT SETTING.

Telegrams, "INCLINED, LONDON."

Little & Graham Ltd.

RETORT HOUSES ERECTED COMPLETE

WORKING RESULTS GUARANTEED

GILBERT LITTLE

MAURICE GRAHAM, A.M.I.C.E.

ENGINEERS CONTRACTORS AND Carbonizing Specialists.

3 & 4, LIME STREET SQ.

RIMBAULT LONDON, E.C.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Bombay Gas Company, San Paulo Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,

LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON,

FITTER.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON AND COAL COMPANY, Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]

TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.

Tudhoe Gas-Works, Spennymoor, 8th June, 1893.

Messrs. The

WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.

Yield of Coke: 13½ cwt.

Illuminating Power of Gas, average of a series of tests, **17 Sperm Candles.**

The Coke was of excellent quality.

The following is a complete ultimate Analysis of the Coal.

	Per Cent.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,

Yours truly,

A. B. COWAN,

Manager.

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE NEWCASTLE-ON-TYNE.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

ALEXANDER CAMERON,

CANNEL & GAS COAL MERCHANT,

48, WEST REGENT STREET,

GLASGOW.

CLAYTON SON & Co., LTD.,

MAKERS OF LEEDS

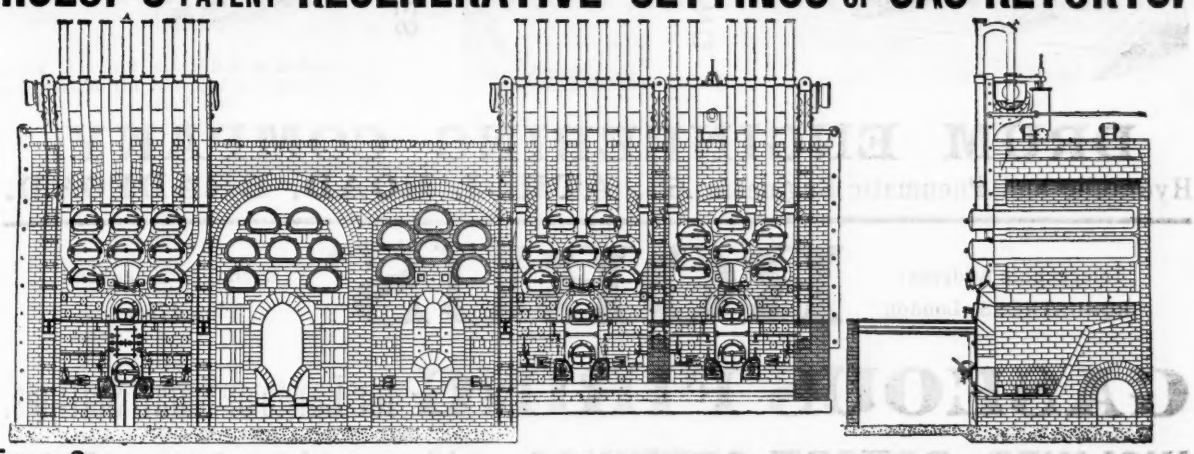
LARGEST GASHOLDER IN THE WORLD

ALSO THE LARGEST METAL TANK

See Advertisement last week, also next week

MAKERS OF RETORT-LIDS OF ALL FORMS & SHAPES BY SPECIAL HYDRAULIC MACHINERY

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS, CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Specifications are furnished for the complete erection of Ovens, with or without Retort and Bench Mountings; or complete erection undertaken if required, and carried out by specially Trained Workmen.

Further particulars may be obtained on application to the Patentee's Agents: C. M. HAMILTON, 5, Stuart Street, Shawlands, Glasgow; J. E. FISHER, Stourbridge; JOHN WALSH & SONS, Retort Builders, Halifax, Yorkshire; RICHARD TURNER, Retort Builder, Denton, Lancashire; and from the Principal Agent, R. F. HISLOP (son of Patentee), Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

SPENT LIMES NO LONGER WASTE PRODUCTS

Under G. R. HISLOP'S Patents, all Spent Limes are most effectually, economically, and continuously recovered at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it.

Descriptive Pamphlets and Terms from Agents as above.

TAR AND LIQUOR PURCHASED.

JOHN CLARKSON MAJOR,
(*Established 1851.*)
Tar Distiller and Manufacturing Chemist,
WOLVERHAMPTON.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

T. B. KITTEL, SHEFFIELD.
CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL
ENGLISH & SCOTCH CANNELS.
REAL SILKSTONE GAS COAL
ANALYSIS AND PRICES ON APPLICATION.
T. B. KITTEL, SHEFFIELD.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD
MANUFACTURERS OF
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FOR ENGINEERS.
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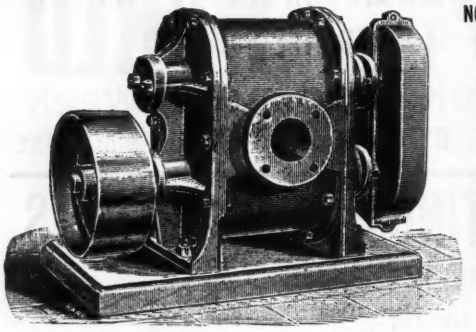

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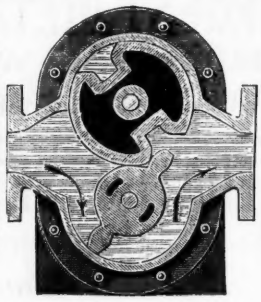

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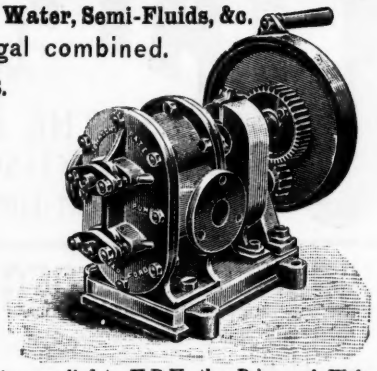

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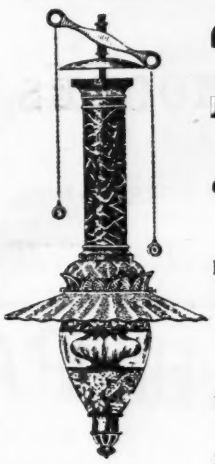

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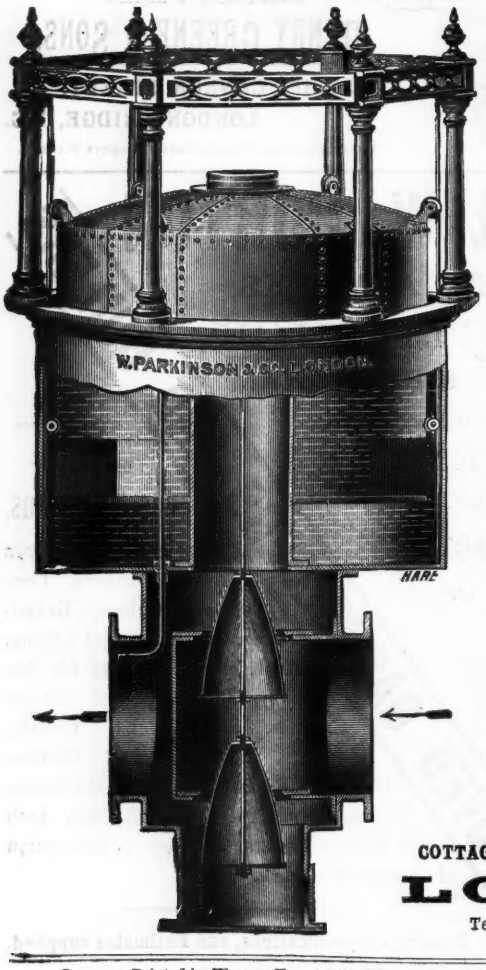

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See also Advt. p. 526

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